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THE
ASIATIC SOCIETY OF BOMBAY
Town Hall, Bombay.

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BOMBAY

TRANSACTIONS

MICROFILMED
ROLL No. 3

OF THE

BOMBAY GEOGRAPHICAL SOCIETY,

FROM JANUARY 1847 TO APRIL 1848.

EDITED BY THE SECRETARY.

BOMBAY:
PRINTED AT THE TIMES PRESS,
BY JAMES CHESSON.

MDCCCXLVIII.

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ERRATA.

Page 2,	line 12	—For *vertical* read *vortical.*
„	„	—For *distruction* read *destruction.*
4	26	—For *chancelled* read *channelled.*
7	35	—For *true-westerly* read *line-westerly.*
8	11	—For *Gosgets* read *Gasgets.*
11	26	—For *Lat.* 11 *S.* read *Lat.* 11 *N.*
12	15	—For 27.70 read 29.70.
„	25	—For *halt* read *bolt.*
14	6	—For *their* read *these.*
24	16	—For *cannot be* read *cannot now be.*
29	22	—For *month* read *months.*
„	41	—For *at* the Northern read *in* &c.
34	19	—For *on ordinary* read *on the ordinary.*
„	34	—For *of* low sandy read *of the* low &c.
„	„	—The word "*is*" to be omitted.

MEETINGS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY.

A MEETING of this Society took place in their rooms, Town Hall, on Thursday the 4th February 1847—the Hon'ble J. P. Willoughby, Esq., Vice-President in in the chair. Present—the Hon'ble L. R. Reid, Esq.; Dr J. Bird, member of the Medical Board; Colonel N. Campbell, Quarter-Master General; C. J. Erskine, Esq., C. S., Private Secretary to the Hon'ble the Governor; Dr J. Glen, member of the Medical Board; Major J. Holland, Deputy Quarter-Master General; Dr J. Scott, Secretary Medical Board; Ali Mahomed Khan, Esq.; and Dr G. Buist, Secretary.

The minutes of last General Meeting having been read, the following donations and letters were laid before the Society:—

PAPER.—By Government.—Extract paras. 2 at 6 of a letter from the officer commanding the steam vessel *Victoria*, with a letter from Lieut. Colonel P. M. Melvill, Secretary to Government, dated Bombay Castle, 28th September, No. 1421 of 1846, Marine Department.

BOOKS.—By the Royal Society of Northern Antiquaries at Copenhagen, through the Bombay Branch of the Royal Asiatic Society.—2 copies of Memoires de la Societe Royale des Antiquaires du Nord, for 1840-43; Memoirs sur la decouverte de l' Amerique, audixieme siecle, par C. C. Rafu, for 1843; Antiquarisk tidsscrift udgivet af det Kongelige Nordiske Oldskrift, Selskab, for 1843; 2 copies Nemoires de la Societe Royale des Antiquaires du Nord, for 1844; 1 copy of the Annual Report for 1834; 3 copies of the General Anniversary Meetings which took place on the 29th January 1838, 31st January, 1839, 31st January 1840; 5 copies of the Liste de ses Membres Fondateurs for 1845; 4 copies of the Asiatic Section; 1 copy of the works lately published on America; 1 copy of the works recently published by the Society on Critical Opinions; 1 copy of Extrait des Statuts Constitutifs; and 1 paper of Sanct Thomae Tidende, 11th Juni, 1845;—with two letters dated Copenhague, le 19th Novembre, 1845.

By the Author, through Capt. H. B. Lynch, I. N.—Documents sur l' Histoire, la Geographie, et le Commerce de la Partie Occidentale de Madagascar, *recueillis* et redigos par M. Guillain, Capitaine de Corvette—*Paris*, Imprimerie Royale, 1846.

By the Royal Geographical Society of London, through John Connon, Esq., per Madden & Co.—The Journal of the Royal Geographical Society of London, vol. 15th, part 2nd of 1845.

By the Author, through Mr H. G. Cannon, *Bookseller*.—A Statement of Facts relative to the Transactions between the writer and the late British Political Mission to the Court of Shoa, in Abyssinia. By C. T. Deke, Esq., P. H. D., F. S. A., F. R. G. S., &c. &c.; with a letter dated 6 St. Mildrea's, London, 29th September 1846.

Maps.—By Commander J. A. Young, I. N.—Map of the Colony of New South Wales, exhibiting the situation and extent of the appropriated lands, including the Counties, Towns, Village reserves, &c.; compiled from authentic surveys &c., respectfully dedicated to Sir John Barrow, Bart., President of the Royal Geographical Society &c. &c. &c., by his obliged humble servant, Robert Dixon, Esq.—Map of Moreton Bay, part of Darling Downs, and Clarence districts, shewing the stations occupied by the squatters, N. S. Wales, compiled from the most recent surveys, and published by Robert Dixon, surveyor, in 1843.—Map of Darling Downs and part of Moreton Bay, shewing the stations occupied by the squatters.—Map of New England, Port Macquarie and Clarence districts, New South Wales, exhibiting the stations occupied by the squatters.—Map of Gipps' Land, shewing the stations occupied by the squatters.—And chart of Port Albert, from an accurate survey by T. S. Townsend, Esq, Surveyor General's Department; with a letter from the donor, dated Bombay, 5th October 1846.

Letters.—From Lieut. J. F. Jones, I. N., acknowledging the receipt of the Book of Regulations, and thanking the Society for his election as a member.

From R. K. Pringle, Esq., Chief Secretary to Government, dated 23rd November, No. 3699 of 1846—forwarding 5 printed copies of a despatch from the Hon. the Court of Directors to the Government of India [No. 6,] dated 3rd June, 1846, and intimating that Government would be happy to receive from the Society any information that may be likely to promote the object which the Hon'ble Court have in view in forming a Statistical Department in their Home Establishment.

"FINANCIAL DEPARTMENT. (STATISTICAL.) NO. 6 of 1846.

"OUR GOVERNOR-GENERAL OF INDIA IN COUNCIL.

"1. The great practical importance of Statistical enquiries, and the attention which they now receive from the most enlightened European Governments, have induced us to take measures for investigating the Satistics of the Countries under our administration, and for arranging and preserving in a form convenient for reference, the information which may be attainable.

"2. With the view of accomplishing these ends, we have formed a Statistical Department in our Home Establishment, in which the requisite enquiries will be conducted, and the materials thereby obtained classified and compared.

"3. The voluminous Records and Documents in our possession contain a vast amount of Statistical information, and the labors of the new Department will, in

the first instance, be directed to extracting and rendering it available for reference; these duties, which have already commenced, will continue for a long period to claim a large share of the time and attention of the Department, but the results will be imperfect unless by the co-operation of our Governments in India in collecting and transmiting Statistical information we are enabled to remedy the defects, correct the inaccuracies, and as the condition and circumstances of all countries are in many respects constantly varying, to note the changes which time or other causes may produce.

"4. We do not doubt that our servants will cheerfully afford their assistance for these purposes, and as the aid which they may render in this respect is not intended, and must not be permitted, to interfere in any degree with their ordinary duties, no detriment will arise to the public Service, but on the contrary much advantage may be expected from the transmission home of such information as to local details which so many of our servants cannot fail to possess.

"5. Information will be most desirable on such subjects as the following :

"LAND.—Area. Geological structure, Natural aspect. Soil. Atmosphere and Climate. Productions. Modes of cultivation. Prices of principal products. Tenure and occupation. Modes and rate of Assessment. Labor employed, and its remuneration.

"WATER.—Navigable Rivers. Description of. Length of. How far navigable. Vessels employed on them.

"LAKES.—Description and situation.

"CANALS.—Their purposes. Length and depth. Vessels employed on them. Cost and return on the outlay. Wells and Tanks. Means of irrigation in each district. Harbours, and Shipping frequenting them.

"CITIES.—Towns and Villages. Situation and general description. Number of houses, and whether Puckha or Kutcha.

"POPULATION.—Numbers of people of different descriptions. Employment. Languages, Condition, Health, and Disease. Ditto of Troops especially—with presumed causes of healthy or diseased state, and the treatment (not strictly medical) found to be useful.

"WEALTH.—Education, and method of pursuing it. Charitable Institutions, not Educational. State of litigation and of crime. Police, number, remuneration, and efficiency.

"COMMERCE.—Manufactures. Capital employed. Imports and Exports from official sources. Exchange. Weights and Measures. Coins, Banking operations, Lending and borrowing. Modes of transit and communication. By Land, by Water. Impediments and their duration. Fords, Ferries and Bridges. Postal arrangements. Taxation. Sources of Revenue, and produce of each Tax. Mode of Collection. Number in Sebundy or other Corps engaged in collecting Revenue. History, and Antiquities, facts illustrative of early or more recent history, and of changes, Political or Agricultural. Public Buildings.

"6. We need scarcely observe that in Statistical investigations, the most rigid accuracy as to matters of fact is indispensable. Erroneous information will be worse than none, because it can but tend to mislead.

"7. There may be some subjects, especially those relating to physical science, with which our servants generally may not be minutely acquainted, and no statement on these or any other matters of enquiry will be of any value, unless they be both precise and accurate. Where the requisite measure of scientific knowledge is not possessed by others, it may, perhaps, in many cases, be supplied by our Medical Officers, and their aid will, we doubt not, be cheerfully rendered whenever required.

"8. In conclusion, we direct attention to the following general instructions:—

"9. In all cases where practicable, reports should be the result of the personal knowledge of the Officer reporting, and where such is the fact, it should be mentioned.

"10. Where from any cause the personal knowledge of the Officer cannot be extended to any object of enquiry, the authority on which the reported facts rest must invariably be stated, either in the margin or in the body of the report.

"11. When estimates only can be furnished, the grounds of each estimate must be stated, and the reasons for adopting it.

"12. Where information is orally given, it should be committed to writing at the time,—in like manner personal observations should be recorded at the moment of making them.

"13. In addition to the names by which places are known among Europeans, it would be desirable that the original names should be given, both in the Devánágari* and Urdu character, according to the best authorities, especially local and native.

"14. In regard to coins, weights and measures, care must be taken to preserve uniformity as to valuation, comparison, and conversion, and to insure this, Prinsep's Useful Tables may be taken as a guide.

"15. Where any material variations exist in different parts of any country, or divisions of a country, reported on, the nature and limits of such variations should be precisely pointed out.

"16. It will be observed that the greater part of the instructions above are designed to ensure accuracy, the importance of which we have already adverted to. It is the more necessary to dwell upon this point, inasmuch as some previous attempts to afford statistical information are unsatisfactory, because obviously incorrect.

"17. Thus in a calculation † made of the population of the North Western Provinces in 1826 (excluding the Ceded Districts on the Nerbudda, and those ceded by the Rajah of Berar,) founded on an actual enumeration of the villages in those

* The Proclamations and State Advertisements in the Calcutta Gazette are usually printed in the Devanagari, as well as in the Urdu or Arabic character.

† Vide statements of the extent and population of British India, as officially returned by the Searcher of Records of the East India Company in first Appendix to the third Report from the Select Committee of the House of Commons 1831. These statements have been adopted by the Hon'ble Mr Elphinstone, Vide his History of India, Vol. I, Page 5.

Provinces, and a partial enumeration of the houses, the amount is taken at 32,206,806, and the number of square miles occupied by this vast mass, as ascertained by measurement upon a map, is stated to be 66,510. Thus, rejecting fractions, it would give a population of 484 to the square mile ; while in an estimate of the population of the principal portion of the Lower Provinces of the Bengal Presidency in 1822, the amount is given at 37,503,265, and the amount in square miles (ascertained as in the North Western Provinces by measurement upon a map) at 153,802, affording no more than 243 inhabitants to the square mile, little more than half the number claimed for the North Western Provinces, notwithstanding that the Lower Provinces contain the great Cities of Calcutta, Dacca, Moorshedabad, and Patna, and the populous tracts around them.

"18. But the population of China, universally considered one of the most densely peopled countries, is, according to the highest native * estimate, only 277 to the square mile.

"19. Further, in a Statement of the Statistics of the North Western Provinces, printed by order of the Lieutenant Governor, and bearing date the 25th February 1842, exhibiting a view of the area and population of twenty-two Districts, constituting by far the larger portion of those Provinces, we observe particulars which lead us to suspect that even this latter document is not trustworthy. *Aligurh*, a district without any considerable Town, is stated to have an agricultural population of 56,679, and a non-agricultural population exceeding it more than *eleven times*, the number given being 644,499; while the District of Benares, containing the great and populous city of the same name, which, with its suburbs, has been estimated to contain 200,000 souls, is said to have 299,167 agricultural inhabitants, and only 145,940 non-agricultural.†

"20. We notice these extraordinary errors, that we may impress upon those who may be called upon to act upon our present orders, the necessity of employing such vigilance and attention as may be sufficient to guard against the transmission hereafter of any statement so deficient in accuracy.

"21. It should be fully borne in mind, that every statement that may be furnished will undergo searching examination at home, and we trust that each one will be prepared with such care as may ensure our approbation.

"We are, &c.

"(Sd.) J. W. Hogg.
„ H. St. G. Tucker,
„ John Loch.
„ J. L. Lushington.
„ John Cotton.
„ W. L. Melville.
„ W. H. C. Plowden,

(Sd.) F. Warden.
„ E. Macnaghten.
„ H. Shank.
„ J. Petty Muspratt.
„ Henry Willock.
„ John C. Whiteman.
„ Henry Alexander.
„ Robert Campbell."

"London, *the 3rd June*, 1846."

* Census taken in 1812. Vide Davis's China, page 413.

† Note.—According to Mr McCulloch, vide Geographical Dictionary, Vol. 1, page 852, the relative density of the population of France, abounding as it does in capital manufactures, and large towns, is only 161 to the square mile.

From Lieut. Col. P. M. Melvill, Secretary to Government, Marine Department, dated 1st December, No. 1717 of 1846, intimating that as Her Majesty's 17th Regt. is about to proceed to England, it has become necessrry to recall Serjeant Moyes of that Regiment, who is conducting the Tidal and Meteorological Observations at Aden, should he not be willing to purchase his discharge or volunteer into one of Her Majesty's Regts. serving in India. The Political Agent at that station has in the mean time been directed to make such arrangements as may be in his power for the care of the instruments, and, if possible, the continuation of the observations.

From Messrs Remington and Co., dated 5th January, 1847, enclosing a copy of the Society's account current with them up to the 31st July, 1846, exhibiting on that date a balance of Rs. 1865, 5 annas, 3 pies, (Rs. 1865-5-3) in the Society's favor.

After some conversation as to the best mode of carrying the wishes of the Court of Directors into effect as explained in the letter of Mr. Pringle, it was agreed that the printed papers on the subject should be embodied in the next issue of the Society's Transactions; and that members should be particularly requested to assist in furnishing any items of the information desired that might be procurable; the Secretary of the Society being charged with the responsibility of arranging these, and forwarding them to the Court of Directors, who should also be provided with sets of the Society's Transactions, for the use of the newly-created Statistical Department. It was stated that the printed papers just referred to had already been published in nearly all the newspapers in India, so that members must already be well aware of their contents.

In reference to Colonel Melvill's letter relating to Mr Moyes, it was stated that that officer had volunteered into another regiment, and would continue his services in conducting the observations at Aden. No general meeting having occurred since the receipt of Colonel Melvill's letter of June in reference to a Tidal Observatory near the Lighthouse on Perim Island, the Secretary was directed to address Government on the subject;—respectfully to call attention to the circumstance that none of the Aden observations promised to be forwarded them through the Observatory, had yet reached them; and as Mr. Orlebar, to the care of whom the charge of the Aden and Kurrachee observations had been entrusted, had returned to Europe, the Society renewed their offer to take in hand the supervision of these, should this meet the pleasure of Government. The arangements in Scinde, which were suspended in consequence of the demand for men and absence of officers when the army marched on Bahawulpore, might now be resumed on the terms formerly specified by Government and about to be acted on when the interruption referred to occurred. There were tide-gauges in store, at the service of Government, both for Scinde and Perim. Government had acquiesced in the establishment at the latter place, provided the duties were not beyond the capacity of the keeper of the lighthouse—an intelligent native,—as there were no Europeans on the island. The expence of the instruments for Perim would ultimately fall on the grant conceded by the Admiralty, provided they acquiesced in the limitations formerly made on the scheme intended to be patronized by them, which might now once more be ex-

tended, should such be the pleasure of Government, to the limits originally proposed.

A fresh issue of the Transactions was laid before the Society, and it was intimated that the store of papers considered worthy of publication was at present nearly exhausted.

The Treasurers reported that after the defrayment of all their liabilities, and collection of the payments now falling due, the Society would have a balance of nearly three thousand rupees in its favour ready to be expended on further publications.

The thanks of the Society were ordered to be given to the various contributors to its repositories and transactions.

The Secretary was directed to write to the Lords of Her Majesty's Admiralty on the subject of the scheme of observation formerly patronized by them, so soon as an answer had been received from the Local Government.

The meeting then adjourned till the 1st Thursday of May.

THE Anniversary Meeting of this Society took place in their Rooms, Town Hall, on Thursday the 6th May 1847, at 3 o'clock P. M.

Present.—Dr. J. Bird, (in the Chair); Dr. J. Scott; Captain H. J. Barr; and Dr. Geo. Buist, L. L. D., Secretary.

The minutes of the Ordinary Quarterly Meeting held on the 4th February last were read and approved.

Resolved.—That the Hon'ble the Governor should be requested to become Patron to the Society.

The following papers, books, letters, and map, were then laid before the meeting:—

PAPERS.—*By Government.*—Extract from a Journal of a Steam trip to the North of Baghdad in April 1846, with notes on the various objects of interest met with, by Lieutenant J. F. Jones, I. N., accompanied by three drawings representing the modern town of Samarah, and the ruins around it, and the remains of the Forts of Quadasiyeh and Tekrit; with a letter from A. Malet, Esq., Secretary to Government, Secret Department, dated 9th February, No. 65 of 1847.

By the Authors, through Lieut. C. J. Cruttenden, I. N., Assistant Political Agent at Aden.—Maximum and Minimum of Barometer and Thermometer, as taken by Captain Haines, at Steamer Point, and by Sergeant W. Moyes, at Aden, from 1st June to 10th October, 1846.

BOOKS.—*By Government.*—Thornton's [Edward, Esq.,] History of the British Empire in India, vol. 6; with a letter, No. 751, dated 20th March, 1847, General Department, from W. Escombe, Esq., Secretary to Government.

By Government.—Observations made at the Magnetical and Meteorological Observatory at Bombay, from April to December, 1845, and printed by order of the Hon'ble East India Company, under the superintendence of A. B. Orlebar, M. A., Lincoln College, Oxford, Elphinstone Professor of Astronomy and Mathematics; with a letter, No. 15, dated 23rd April 1847, from Commander C. W. Montriou, I. N., in charge Observatory of Bombay, Colaba.

MAP.—*By the Quarter-Master-General of the Army.*—Route Map of the Bombay Presidency, including Scinde, surveyed and collected by the Quarter-Master-

General's Department, Bombay Army; with a letter from Lieut. Col. N. Campbell, dated 22d March 1847.

Letters.—From Lieut. Col. P. M. Melvill, Secretary to Government, Military Department, No. 656, of the 12th February, 1847, transmitting, with reference to his former communication of the 1st December, 1846, copies of correspondence from the Deputy-Adjutant-General of Her Majesty's Forces in India, intimating that an application has been made to the Horse Guards for permission to allow Sergeant Moyes, Her Majesty's 17th Foot, to be transferred to the Hon'ble Company's service, and in the meantime permitting that non-commissioned officer to remain in charge of the Tidal and Meteorological observations at Aden, on the embarkation of Her Majesty's 17th Regiment for England, pending the orders of His Grace the Duke of Wellington on the subject.

From W. Escombe, Esq., Secretary to Government, General Department, No. 624, of the 4th March, 1847, requesting that the Secretary of the Society would put himself in communication with the Post Master General, who has been instructed to forward, if practicable, the Books and instruments &c. alluded to in his letter under reply, to the Agent for the Governor General N. W. Frontier, by Post, free of charge.

The following Gentleman was then elected a Member of the Society.

Lieutenant H. A. Frazer, I. N. Proposed by Captain H. J. Barr, and seconded by Dr. Scott.

An abstract of the votes for the Office-bearers for next year having been made, the following appeared to have been chosen by a majority of votes on the printed list:—

Vice-Presidents.

1. The Hon'ble J. P. Willoughby, Esq.
2. The Hon'ble L. R. Reid, Esq.
3. Captain Sir R. Oliver, Kt., R. N.

Resident Members.

1. Major J. Holland.
2. Captain H. B. Lynch, I. N.
3. Lieutenant G. Jenkins, I. N.
4. Dr. C. Morehead.
5. Lieut. Col. P. M. Melvill.
6. Lieut. Col. N. Campbell.
7. C. J. Erskine, Esq.
8. Dr. J. Bird.
9. Dr. J. Glen.
10. Dr. J. McLennan.
11. R. K. Pringle, Esq.
12. Commander J. A. Young, I. N.

Non-Resident Members.

1. Major H. C. Rawlinson.
2. Captain E. P. Del'Hoste.
3. Captain G. Fulljames.
4. Major G. LeG Jacob.
5. Captain T. G. Carless, I. N.
6. Major Sir W. C. Harris, Kt.
7. Lieutenant C. J. Cruttenden, I. N.
8. Lieutenant W. Christopher, I. N.

The accounts for the year having been exhibited, showed a balance of Rs. 2544-9-6 in the hands of the Treasurers. In the course of the year, Rs. 1315 had been expended on printing; for the establishment Rs. 564; for contingent and other charges, Rs. 236-15-9: in all, Rs. 2115-15-9.

Annual Statement of Receipts and Disbursements of the Bombay Geographical Society, 1st May 1846 to 30th April 1847.

Disbursements.				Rs.	A.	P.
April 30th, 1847.						
To Printing				1,315	0	0
„ Establishment				564	0	0
„ Contingent expenses				175	15	9
„ Mr J. T. Bell's bill for duty, customs, clearing charges &c., on 3 cases containing Instruments and Books, forwarded by Mr Shillinglaw at London for Mr Patrick Vans Agnew, at Lahore	46	11	0			
„ Cooly hire, packing charges, Boat freight for sending 4 cases (addressed to P. Vans Agnew, Esq. at Lahore) over to Kurrachee, in charge of the Secretary to the Scinde Association there	14	5	0			
				61	0	0
				2,115	15	9
Balance in favour of the Society, viz.						
„ In the hands of the Treasurers up to this day	2,485	11	11			
„ Ditto...in the hands of the Secretary	58	13	7			
				2,544	9	6
			Rupees	4,660	9	3

Receipts.				Rs.	A.	P.
April 30th, 1846.						
By Balance in the hands of the Treasurers up to this day.	2,220	11	11			
„ Ditto...in the hands of the Secretary	84	12	0			
				2,305	7	11
August 15th.						
„ Amount received from Government for supplying 300 printed copies separately stitched, of an extract from a Report on the district of Babriawar by Captain G. LeG Jacob, late 1st Assist. to the Political Agent at Rajcote, as per Government order from Political Department, dated the 1st Aug., No. 3003 of 1846				200	0	0
April 30th, 1847.						
„ Ditto...of Government subscription for 12 months, at 50 Rupees per mensem				600	0	0
„ Ditto...of subscriptions of Members for this year				1,437	4	0
„ Ditto...of printed copies of this Society's proceedings sold				100	8	0
„ Ditto...of do. of the Royal Geographical Society's Journal sold				11	5	4
			Rupees	4,660	9	3

(Signed) GEO. BUIST,
Secretary to the Society.

Bombay, 30th April, 1847.

Some discussion occurred in reference to the backward state of the scheme of tidal and meteorological observations sanctioned by H. M.'s Lords of the Admiralty, and subsequently in part by Government. A letter had been written so far back as the 15th February, to the Secretary in the Military Department, renewing the offer formerly made by the Secretary, to superintend the observations over which it was purposed to place Mr. Orlebar in charge. To this no reply has hitherto been received. The letter proposed to have been sent to H. M. Lords of the Admiralty had been delayed until the receipt of the answer of the Bombay Government, as it appeared to be owing to the estrangement of the local observations from under the control of the Society that all other delays had arisen.

The meeting then adjourned till the 1st Thursday of August.

THE Ordinary Quarterly Meeting of this Society took place in their rooms, Town Hall, on Thursday the 5th August 1847,—the Hon'ble L.R. Reid, Member of Council, Vice-President, in the Chair. The following Members were present:—Dr. J. Bird; C. J. Erskine, Esq., C. S.; Dr. J. Glen; Lieut.-Col. G. Moore; Manockjee Cursetjee, Esq.; Ali Mahomed Khan, Esq.; and Dr. G. Buist, Secretary.

The Minutes of the Anniversary Meeting held on the 5th May last, were read and approved of.

Commander G. B. Kempthorn, I. N., was proposed as a member of the Society by Dr Buist, seconded by Dr. J. Bird, and unanimously elected.

The following donations were presented, for which the Secretary was directed to return the best thanks of the Society to the donors:—

PAPERS.—By the author, through Lieut. C. J. Cruttenden, I. N., Assistant Political Agent at Aden.—Meteorological Observations, as taken on Shum Shum, and on Seerah Island, during the month of June 1847: and Diagram, showing the time of high and low water at Aden, as traced by the tide-gauge, between the 13th and 29th June, and from 29th June up to the 13th July 1847, by Serjeant W. Moyes,—with a letter dated Camp Aden, 16th July, 1847.

BOOKS.—By Government. Printed Copy of the Report of the Superintendent of Roads and Tanks for the year 1845-46, with a letter, No. 1780, of the 25th June 1847, from W. Escombe, Esquire, Secretary to Government, General Department.

By the Royal Geographical Society of London, through Mr J. W. Richardson, Bookseller of London, to the care of J. T. Bell, Esquire, of Bombay.—The Journal of the Royal Geographical Society of London, vol. 16th, part 2d, of 1846; with a letter from the above Bookseller, East India Agent, &c., dated London, No. 23, Cornhill, March 12th, 1847.

By the Société de Geographie de Paris, through the Royal Geographical Society of London, and Pestonjee Framjee and Co., of Bombay.—Bulletin de la Société de Geographie, tome 5 of 1846, tome 1 of 1844; and Grammaire et Dictionnaire abreges de la langue berbere composes par feu venture de paradis, &c. &c, of 1844,—with a letter dated Paris, le 1st Mai, 1844.

By the Société de Asiatique de Paris, through the Royal Geographical Society of London.—Journal Asiatique ou Recueil de Memoires &c., tome 7,

No. 35, Juin; tome 8, No. 36, Juillet; tome 8, No. 37, Aout, Septembre; and tome 8, No. 38, Octobre 1846.

LETTERS.—From C. J. Erskine, Esq., Private Secy., dated 11th May, 1847, acknowledging the receipt of the Society's letter of the 7th May 1847, enclosing an extract from the Minutes of a Meeting, intimating, by desire of the Honorable the Governor, that his Honor feels highly gratified by the request therein contained to become Patron of the Society, with which he has much pleasure in complying.

From John Macleod, Esquire, Secretary to the Scinde Association, dated Kurrachee, 19th April, 1847, acknowledging the receipt of the Society's letter of the 30th March, No. 11 of 1847, and intimating that his Excellency the Governor of Scinde has been good enough to direct that the boxes of books and instruments therein alluded to, shall be forwarded to Sukkur as soon as possible after their delivery there, and further states that steps will be taken for the onward transmission from Sukkur of the articles in question by the first opportunity.

From W. Escombe, Esquire, Secretary to Government, General Department, dated 17th July, No. 2026 of 1847, transmitting the pages of the 4th volume of "Thornton's India" which were missing when it was presented to the Society in the month of February 1845.

Copy of a printed Circular from Colonel J. R. Jackson, Secretary of the Royal Geographical Society, dated London, January 1847, intimating that Mr. John Shillinglaw, late Librarian of that Society, has been appointed the Society's Agent for the supply of the Journal of the Geographical Society of London to all such Honorary and corresponding Members, and Scientific and Literary Institutions, as are entitled to receive copies.

There was scarcely any business of note before the Society. A lengthy conversation occurred amongst the members as to the best mode of forwarding the various objects the Society had in view. It appeared that the funds were in a singularly flourishing state, and that any enterprise that was deemed desirable might be undertaken. A new number of Transactions would be placed in the hands of the printer so soon as a sufficiency of papers was in readiness. In reference to the great scheme of Tidal Observations, it was stated that no reply had been received from Government to the Secretary's letter of the 19th Feb. last, and that the want of this had prevented the renewal of correspondence with H. M.'s Lords of the Admiralty. It was stated that the matter must, through inadvertence, and pressure of more emergent business, have fallen aside,—no obstacle or indisposition on the part of Government to do everything that could reasonably be desired being suspected to exist. The Secretary was directed to address Government on the subject, and to renew the offer of supervision and publication formerly made by the Society. The necessity of this became every day more and more apparent, the elaborate but very intricate diagrams of Mr Moyes, now and formerly laid before them, indicating the extreme necessity of a directing and guiding power before any results of value could be looked for.

The Meeting then adjourned to the first Thursday of November.

THE Ordinary Quarterly meeting of this Society took place in their rooms, Town Hall, on Thursday the 4th November 1847, at 3 o'clock P. M. Present—Captain H. B. Lynch, I. N., member in the chair.—Commander D. Jenkins, I. N.; Dr J. Glen; Captain H. J. Barr; and George Buist, Esq., LL.D., Secretary.

The minutes of last meeting were read and approved of. The Secretary read the letters written by direction of the Society to the Secretary to Government, Marine Department, enclosing copy of letter of February 1847, formerly directed to be written on the same subject—to neither of these had any answer been received. The Secretary was directed to address Government, taking the opportunity of doing so offered by the letter of Mr Moyes, and the Report in the *Athenæum*, to draw up a plan for rendering effective the Aden observations, and make tender of this to Government should they decline other aid; and to renew the offer which if accepted of would restore the original scheme to its integrity. The letter was directed to be submitted to the Committee, in consideration of the limited attendance at the present meeting. A lengthened conversation occurred on the subject of the Physical researches generally in contemplation by the Society, and in which the phenomena attendant on the Hurricane of April were specially adverted to,—the Society having been fortunate enough to secure a large mass of valuable papers on the subject. The following donations were presented, for which the Secretary was directed to return the best thanks of the Society to the donors.

PAPERS.—By Government.—A Translation, by Captain G. G. Malet, (late Resident at Khyrpoor,) of a work by an Historian called Moosoome, containing a History of Scinde from the year 676 to 1623, was forwarded by Mr. Chief Secretary Malet on the 20th September last, for the inspection of the Society, and it was intimated by that gentleman, that a copy of the paper would be presented to the Society if it were willing to publish it.

By Government.—Two Reports of Journeys made into the interior of the south-east coast of Arabia, viz. 1st, An account of a journey from Soor to Jahlan, and thence to Ras Roves, on the 6th November 1845, by Messrs. Ward, Silvester, and James, of the Honorable Company's Surveying Brig *Palinurus;* and 2nd, an account of an Overland journey from Leshkairee to Moskat and the Green Mountains of Osman, on the 22nd November 1845, by Mr. Cole, of the East India Co.'s S. B. *Palinurus;* with a letter from A. Malet, Esq., Chief Secretary to Government, Marine Department, dated 23rd September, No. 1330 of 1847.

By the Author.—Drawings shewing the time of high and low water at Aden, traced by the Tide-Gauge, between the 13th of July and 9th of September last, by Serjeant W. Moyes; with a letter dated Camp Aden, the 16th September, 1847.

BOOK.—By the Author.—Address to the Ethnological Society of London, delivered at the Anniversary Meeting on the 29th May 1846. By Rear-Admiral Sir Charles Malcolm, President.

LETTERS.—From H. E. Goldsmid, Esq, Private Secretary, dated Dapoorce, the 17th August, 1847, conveying the best thanks of the Honorable the Governor

to the Bombay Geographical Society for the copies of its Transactions forwarded on the 12th August last.

From D. J. Bird, Secretary to the Bombay Branch of the Royal Asiatic Society, dated the 14th August 1847, forwarding copy of a letter from the Foreign Secretary to the Government of India, intimating that a Mission was about to start to the Frontiers of Chinese Tartary, and that he would be glad to learn whether there were any questions of Literary or Scientific interest which Members of the Society might wish to be made the subjects of investigation by the Mission.

From Dr. J. Bird, dated the 11th September 1847, acknowledging the receipt of the Society's letters of the 6th and 7th instant, and returning the thanks of the Asiatic Society for the suggestions on various points to which the attention of the Members of the Mission proceeding to the Frontiers of Chinese Tartary may be usefully called,—and intimating that the same had that day been forwarded to Mr. Elliot, the Foreign Secretary with the Governor-General at Simla.

From Dr J. Bird, Secretary to the Bombay Branch of the Royal Asiatic Society, dated the 18th October 1847, forwarding an original letter of thanks from the Foreign Secretary with the Governor-General, for the able questions on the 'Ancient Beaches' and 'Salt Deserts' of Central Asia, furnished by this Society for the Members of the Thibet Mission.

" No. 32 of 1847.

"To the Secretary of the Bombay Branch of the Royal Asiatic Society.

"SIR,—I have the honor to acknowledge your letter of the 14th instant, containing an extract from a letter of the Secretary to the Government of India, in which it is intimated that an exploratary expedition, consisting of Captain Cunningham, Dr T. Thompson, and Lieutenant Strachey, has been appointed to proceed into Chinese Tartary, the Secretary desiring to be informed whether there be any question of Literary or Scientific interest desired by you to be investigated by the Mission. In reply to this I am directed by the Geographical Society to state that the names of the gentlemen composing the Mission are too well known to permit of any suggestions being made to them with hope of advantage, on the subject which more especially engages our attention, and which will be one main object of their researches—Political Geography,—as on this their objects must be the same as our own. In Physical Geography the Society might perhaps draw their attention to certain points on which enlightenment, were it procurable, would be pre-eminently desirable: not doubting, at the same time, that the suggestions about to be made are just those most likely to have occurred to themselves as pre-eminently worthy of attention.

"The Baron Humboldt has rendered it much more than probable that at a period shortly before the commencement of our historical æra, the concavity of Turan may have been one vast inland sea, connected on the one hand with the Caspian, on the other by the Balkash and its adjoining lakes, and by channels more or less intricate, with the Icy Sea: and that in the time of Herodotus, or probably as late as the Macedonian invasion, the Aral was merely a Bay or Gulf of the Caspian;

and there seems every probability that the great elevations chiefly prevailing betwixt the 20th and 45th parallels are succeeded by a vast expanse of comparatively low lands, which at no distant date in our Geological æras may have formed the bed of the Ocean.

"It has of late formed one of the most interesting divisions of Geological research to investigate the changes of level, the upheavals and depressions, which at a comparatively recent period of our Geological History have affected the earth, and to trace the elevated shores, the beaches and terraces, which in almost every quarter of the globe mark the boundaries of its former waters. Should the explorers reach any of the regions in which such things are discernible, no notices, however slight, which could be made concerning them, would be considered unimportant by the Society.

"In immediate connection with this the condition of salt deserts, salt ranges of mountains, and formations of rock-salt, will all come to be explored; and in reference to the last of these, the Society would feel much gratification in being made aware as to whether any traces of Animalculæ or their debris were discernible in the salt; and whether it was found associated with the rocks of the new red sand-stone formation with which in other quarters it is generally connected. Where limestone prevails in a salt desert, the transformation of carbonate into sulphate of lime, occasioned apparently by the mutual decomposition of the sulphates of the salt and calcareous constituents of the earth, is generally discernible; this phenomenon presenting itself in Scinde, Persia, Arabia, and Egypt, and in most places, it is believed, where the combination of circumstances referred to exists. It would be important to know whether it was universal.

"It would be of the utmost importance to observe whether sea shells exist in any of the salt deserts that may be traversed; and, if so, whether they be of any existing species, as well as to observe whether any of the ligniferous rocks such as those about Cairo, Scinde, and on the Coromandel coast, can be traced. All information regarding the extent of the agency of Icebergs and Glaciers, in the removal from place to place of masses of earth and stone, makes the examination of transported boulders, especially of those marked with grooves, and of gravel, Till, &c., which seem to form moraines, or indicate the existence of ancient glaciers, is of the utmost interest to the Society.

"The Mission is stated to be in possession of a suply of Magnetic instruments: all observations on the dip and direction or vertical and horizontal declination of the needle—the intensity of magnetic force, the diurnal variation and effect, if any, of local attraction—would be considered of the utmost interest and importance; as well as any note which might be made on the influence exercised on the magnet by the Aurora Borealis, should the mission reach a latitude at which this is discernible.

"In reference to Barometers and Thermometers, of which the Secretary to the Government of India states the expedition to possess a supply, it would be considered highly important to ascertain the daily range, and hours of maxima and minima. One reading for 24 consecutive hours at any of the most remarkable points reached by the expedition, would be considered most valuable. As the epochs of change

recur, so far as is known, in all parts of the world from two to three hours before noon and midnight, and from four to five hours after them, ten minutely readings from ¼ to 9 to ¼ past 10, and from ½ past 3 to ½ past 5 A. M. and P. M., would go far to determine all that was required to be ascertained. When the approximate hours of maxima and minima were known, two observations daily at each of these would show the monstrual inequality, if any existed—or perhaps indicate the inequalities of the year. All the observations of each day, before being of use for comparison with each other, must be taken on the same spot. Indeed, until the daily fluctuations of the mercury be determined, all observations made with the Barometer, on altitude, must prove fallacious where no fixed standard of reference can be had recourse to. The kind of Barometer should be mentioned, as well as the maker's name: and the fact indicated as to whether or not the mercury has been boiled in the tube.

"In most parts of the world the temperature at ½ past 9 or 10 o'clock gives the mean temperature of the day. One set of hourly observations would indicate whether it was so or not in the regions about to be explored; and, if so, by the help of self-registering Thermometers, a single inspection of a pair of instruments at the proper hour would give the maximum, minimum, the range, and the mean. At Bombay the mean temperature of September is also the mean of the year, and should the explorers be out during the month referred to, it might be well carefully to note its heat. The 9 o'clock observation will probably give the means both of the month and the year. It is not likely a year will be spent by them in any given locality; nor is it safe to assume a local law as of universal acceptation: but we might put up with this information until better could be procured. Deep springs and wells will give a close approximation to the mean temperature of the spot throughout the year, as will a thermometer sunk three or four feet under the surface of the ground, and carefully covered over. We are so utterly devoid of all knowledge of the regions about to be visited, that to ascertain the curvature and direction of the Isothermal lines would solve an important problem in physical geography.

"In case the mission should not be provided with self-registering Thermometers, or in the event of these being broken, it may be mentioned, though probably well known to the gentlemen composing it, that a bottle of water or other vessel of considerable size, sunk in the earth, with a thermometer enclosed, will in the course of eight or ten hours acquire the temperature of the surrounding mediæ, and will, if too much time is not lost in removing it, retain its heat long enough to allow the thermometer to be examined; and will give indications probably within a degree or so of accuracy.

"Should other instruments fail, this will give a pretty close approximation of the altitude of any place in relation to some other in the neighbourhood of which the mean temperature has been determined.

"The humidity of the atmosphere is quite as important a matter in climatology as its temperature or pressure; and the Society would strongly recommend the assiduous use of the wet-bulb thermometer.

"The tint of the sky, and force of the wind, in these unexplored regions, many of which attain such stupendous altitudes, would be interesting; and in defect of, or

addition to, any observations which may be made with the common actinometer, the Society would recommend to the consideration of the mission the simple contrivance of Necker; where, by the use of a coloured card, so much of what is desired to be known may be determined: the wind gauge of Mr. Lind, one of the simplest and most portable of instruments, will give all the indications that are wished for on the strength and velocity of ærial currents.

"These comprise the majority of the most prominent points on which the Geographical Society would most desire enlightenment, though to no branch of human knowledge are they at any time indifferent. They are satisfied that to most of them Captain Cunningham, Dr Thompson, and Mr Strachey, would most likely at any rate devote attention; they forward this letter in compliance with the wish of the Secretary to the Government of India; satisfied, that if what they have done be regarded as superfluous, no worse view is likely to be taken of it, and supposing, at the same time, it may just be possible they have touched on some point which may stimulate enquiry.

"I have the honor to be, Sir, your most obedient servant,

"(Signed.) G. Buist, Secretary to the Society."

"Geographical Society's Rooms, Town Hall, Bombay, 6th September, 1847."

"No. 33 of 1847.

"To the Secretary of the Bombay Branch of the Royal Asiatic Society.

"Sir,—In continuation of my letter of the 6th instant, in reference to the information desired by the Geographical Society on the subject of the Vestiges of the Northern Ocean which might probably become traceable by the Mission about to be sent into Chinese Tartary, I have now the honor to enclose, for transmission to the Secretary to the Government of India, copy of a letter from Mr Robert Chambers, requesting explanation on a similar class of subjects to which the Geographical Society called attention; entertaining no doubt whatever that the Mission will be as anxious to gratify the wishes of a distinguished man of letters as of a learned corporation, where the objects of both are the same.

"The lowermost, or twelve feet, beach spoken of by Mr Chambers, is traceable all around our shores. It forms the Bombay esplanade and drill ground at Colaba, with the whole of the lower ground along the Concan. It is peculiarly conspicuous at Aden, and along the shores of the Gulf of Suez, where it extends many miles into the interior. Another of the beaches of Mr Chambers probably constitutes the whole of the desert portion of Scinde, and of the salt plains betwixt the Indus and Ajmeer. Ascending still higher, we find the most unmistakeable evidences of the existence of a former ocean all over the desert betwixt Cairo and Suez, at an elevation of above 800 feet; nor does it appear to what altitude such things may not be looked for. It is much more than probable, in fact, that in all salt deserts, or wherever Muriate of Soda is to be found in great abundance, other evidences may be detected, at no great distance, of the former presence of the ocean at a period of very recent date compared to that of the origin of the newest of our solid rock formations.

Caves are abundant in most parts of the world. There seem only two classes of causes by which they can have been formed—the sudden disruption of rocks by violence after their induration, or erosion by air or water The aspect of the rock itself will always indicate unmistakeably and at once any circumstances in which the first cause has assisted:—decay and erosion by the action of the air or of moisture, can only occur where the matter affected is soft and easily decomposed. Where neither of these explain the phenomenon, its appearance can only be accounted for by the operation of water in large masses. The aspect of the country will indicate whether this has risen from the sea, from lakes, or from rivers.

I have not had it in my power to refer this letter to the Committee of the Geographical Society, as I was apprehensive it might thereby have been too late for your despatch; and though I am persuaded the views expressed in it will be adopted by them, I am not at present entitled to set them forth as stamped with the weight of their authority.

I have &c. (Signed) GEO. BUIST, Secretary to the Society.

Geographical Society's Rooms, Town Hall, Bombay, 7th September, 1847.

ST. ANDREWS, *July 18th*, 1847.

MY DEAR SIR,—I beg to address you on a subject which I think will be interesting to you, and on which I crave your kind assistance. For about a year past I have given most of my spare time to the examination of Ancient Beaches. I have found and measured them all round this island, and even in Ireland and France. Every where there is a series at uniform heights, leading to the unexpected deduction that the change of relative level of sea and land, by whatever means accomplished, was a process observing equability over a very large region. I read a paper on the subject at the Oxford meeting of the British Association; but the obvious bearing of the facts against prevalent theories caused them to be characterised by Buckland, Lodgewick, &c., as "an audacious generalization," which I shall perhaps have occasion by and bye to remark upon as an exceedingly good joke. Being only stimulated by this opposition to further research in the same line, I am now enquiring after proofs of extended uniformity in Norway and America; and the facts tending to this effect which I have already obtained, would probably surprise you not a little. There are undoubtedly terraces in North America from 60 up to 1000 feet, coming almost to a perfect uniformity with those I have discovered in Britain. I do not yet say that they are identical; but the appearances at present are all that way.

It may be a romantic and disappointing attempt, but I nevertheless wish you will look for terraces in your part of the earth, and have a few good specimens measured. I should not say disappointing, for, though they were found to be entirely discrepant, it were well to know so much; and even in themselves they would form a curious addition to our geological knowledge.—You have given some attention

to our lowest terrace in Fife, one about ten or twelve feet above the present level of the sea, and must therefore know something of this class of objects. Let me mention, however, that the terrace most apt everywhere to be found in a distinct form and character is one at 64 to 70 feet. Strathtysum House is situated upon it here, and it extends a good way in both directions from that place, appearing again at Pitmilly. The other terraces in Scotland are at 107, 126, 165, 192, 208 or 210, 243, 280, 386-92, &c. For example, Pipeland Farm-house is on the 165. The 208 is found at Cairnsmill. Huge fragments of an alluvial plateau at 107 laid down by the Zay at a former level, are scattered over Leuchars parish; Straiton house upon one. There is a less frequently marked beach of 56 feet, at Errol, at Braigie near Dundee, &c. There is one of similar character in some few places at 144 feet. Their being pretty numerous and therefore at small intervals from each other, makes a difficulty in ascertaining that we see in different places memorials of exactly the same rests of the sea. Yet no one that has given the study to the subject which I have done, could fail to conclude that such was the case. What I think most likely to be found in new scenes of the investigation is the 64-70 feet beach, as it is so palpable in various parts of America. I would therefore have you to look particularly for it, keeping the Strathtysum plateau in mind as a model for the whole.

I fully trust to your well-known love of science that this address will not be irksome to you, whether you may be able to comply with my wishes or not. Any facts sent ere a very long time elapses would probably be serviceable for a work I shall by and bye put to press upon the subject.

Believe me, my dear Sir, sincerely yours, (Signed) ROBERT CHAMBERS.

True copy (Signed) GEO. BUIST, Secretary to the R. G. S.

No other business appearing, the meeting adjourned to Thursday the 3rd of February 1848.

TRANSACTIONS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY.

ART. I.—*Remarks on the late Hurricane of April* 1847, *on the Western Coast of India.* By Dr. A. THOM, of H. M. 86th Foot. Accompanied by three Diagrams, shewing the position of the Malabar Hurricane on the 17th and 18th of April last; with a letter from the author.

[Communicated by the Author.]

PREFACE.

THE following paper is offered to the Geographical Society of Bombay, on the presumption that it embraces a subject of local as well as general importance. Even without the realization of one dreadful disaster too much to be apprehended, the known calamities traceable to the effects of the late Hurricane of last April, on the Malabar Coast, are really so appalling and so fraught with the loss of human life, as to affix a melancholy interest to its records. To aid in averting or lessening the evils incidental to the recurrence of such tempests, is a step highly creditable to any body of men, even although it may, in some degree, lead from the legitimate objects of their association.

Societies formed for scientific purposes may nobly lend their assistance in the best interests of humanity, and point the way to those on

whom the duty of giving practical effect to their suggestions must ever devolve. However, the first principles of Governments are supposed to be the preservation of the lives of their subjects, the diminution of human suffering, and conservation of property. If the means of effecting these objects are unknown, the sooner they are sought for the better: if only doubtful, there is still stronger reason for ascertaining the truth. Public money could hardly be appropriated to a more useful purpose. None who read and reason can deny that fully developed hurricanes obey regular laws, although these are not perfectly known and defined—as might be expected in a science as yet in its infancy. It is also well known that while one vessel rushes into all the perils of a vertical gale—perhaps to certain distruction,—another, whether from accident or foresight, may, by lying to, or running in a particular direction, escape without even the loss of a spar. The details of the Malabar Gale contain proofs of this too palpable to be overlooked.

Had a general system of Meteorological observation been established over India and its neighbouring appendages, a complete knowledge of those devastating storms which sweep the Bay of Bengal, and lately ravaged the West Coast and Arabian Sea, would have been obtained, far more satisfactory than anything dependent on the casual and isolate exertions of individuals. A line of littoral posts of observation established at every one or two hundred miles distance, extending from Calcutta round Ceylon or Cape Comorin to Kurrachee in Scinde, and others traversing the Peninsula from east to west, if placed under some system organized by one of the Scientific Societies, would tend to throw important light on the relative force, moisture, and direction, of the two great periodical winds at different parts of the country, on the true nature of their stormy commotions, and the apparent connection of these with their changes. Even medical knowledge might thereby be greatly advanced.

What would this *cost?* is the question of the economist. We think little more than the price of the necessary instruments,—perhaps a sum of £1000 or £1500,—scarcely that which the masts and spars of one ship, the *Buckinghamshire,* cost, to say nothing of the loss of the *Cleopatra, Mermaid,* &c. Among its servants the H. E. I. Company has many officers surpassingly distinguished for intelligence, scientific acquirements, and their almost invariable concomitant—zeal; who, as amateurs, would no doubt willingly volunteer their spare time to the carrying out the objects proposed.

In apologizing for the imperfections which may be found in the following pages, the writer must add that many insurmountable difficulties to the attainment of his object came in the way, chiefly owing to his distance from the sources of information at Bombay and shipping in its harbour, and thus being deprived of the means of having suspected or palpable errors and discrepancies explained or corrected. He has to express his sincere thanks to those—many of whom are perfect strangers to him—who have so warmly seconded his endeavours to collect the requisite information; especially to Mr. NORMAN OLIVER, of the Master-Attendant's Office at Bombay, and Captain LYNCH, I. N., to whom he is indebted for most of the logs of vessels, as well as to other Officers of the Indian Navy. He has also to acknowledge the interesting communications received from Captain MACGREGOR, of the *Buckinghamshire*, and those forwarded by Doctor ST. JOHN at Madras, and Doctor RAE at Ceylon, Deputy-Inspectors of H. M.'s troops. Surgeon MACGREGOR, of H. M. 25th regiment, also kindly collected the information connected with the storm at Cannanore and its neighbourhood.

POONA, 10*th September*, 1847. A. T.

IN an attempt to gather the more important facts connected with the late disastrous Gale on the Malabar Coast, my expectations have been somewhat disappointed; however, I still anticipate the acquisition of more complete and satisfactory details than those which have yet come to hand. In the meantime, while the event is yet fresh in our memory, a few remarks on the subject may be acceptable to some of your readers, and perhaps elicit additional information tending to elucidate obscure points, or correct any errors into which I may inadvertently have fallen.

It is not necessary to the subject to comment on the calamitous consequences of the tempest, as, in its progress from Ceylon to Scinde, it travelled along the Western Ghauts of India, uprooting the giants of the forest, deluging the plains, and spreading desolation among the habitations of man; while, with a fury that was perfectly appalling, it swept the neighbouring ocean and strewed the coasts with the wreck of vessels and human bodies. Apart from the fearful loss of life and amount of suffering, the immense destruction of property occasioned by the gale would be a sufficient reason for seeking to forward our knowledge of these terrible phenomena, and from thence to deduce some rational means of averting the evils incidental to their recur-

rence. It is true that the Arabian sea is rarely subject to such visitations, but this ought to be an incentive not to let so favourable an opportunity slip without collecting all that is known on the subject. Since the storm of 20th April, 1780, noticed by HORSBURGH, perhaps none has ever devastated the Western Coast of India with such severity at that of last April—also about the 20th of the month.

It is much to be regretted that while the tempestuous movements of our atmosphere create a keen interest in the inquiring mind, and are of profound importance to mankind, yet it so happens that the means of discovering their real nature are unattractive, dry, and laborious: at least it would appear so from the neglect with which the whole subject has hitherto been treated, in spite of the exertions of Mr. REDFIELD, Colonel REID, Mr. PIDDINGTON of Calcutta, and a few others. Perhaps one great reason of this arises from the difficulty which the student in this branch of science encounters from the absolute necessity of being dependant on others for details, which too often turn out to be loose, erroneous, or contradictory, and generally the result of casual or misdirected observation. The astronomer can seize within the grasp of his observation the remote object of his study, and alone, night by night, trace its path along the heavens, measure its orbit, and compute its distance. In the laboratory, the chemist is enabled, unaided, to analyze the most crude piece of matter, and render up its simple components in all their purity. Even the geologist, independent of others, may pursue his investigations in the primeval forces of earth: to him the sleeping volcano, river, mountain, and chancelled plain, respectively tell their tale in silence.

Widely different is the case in regard to the study of storms; for here it becomes necessary to accumulate the cotemporary information of many observers who have accidentally been scattered over a vast expanse of land or sea, and who were often careless, ignorant, or unacquainted with what they ought to notice. Hence trivial points are often carefully recorded, while the more important, and even more common, phenomena are unheeded. The consequence is, that, although the Theory of Hurricanes is now pretty well established, it is far from possessing that exactitude which belongs to many other branches of knowledge, and which can only be attained by an extensive system of observation, carried out by competent persons and good instruments. This, however, can only be achieved by the interference of one or more Governments.

To render the following observations more intelligible to general readers, it may be well to convey some idea of what is meant by a Rotatory Gale. It has been ascertained that during great storms or typhoons, within, or near to, the tropics, the wind blows in a circuit round a moving focus; and that the force increases, from light winds or a moderate breeze at the periphery, till near the middle it acquires all the violence and character of the hurricane. Perhaps one of the most extraordinary features in the whole history of storms is the fact of the very centre being occupied by a calm space of ten to twenty miles in diameter, around which the wind revolves with overwhelming impetus. It is also found that the barometer indicates diminished atmospheric pressure, beginning at the exterior of the stormy circle and increasing towards the focus, where the amount of depression of the mercurial column has frequently exceeded two inches. The diameter of the area over which the wind rotates in conformity with the circle, is often 600 or 700 miles, but it is only within 100 or 150 miles of the centre that the force is equivalent to a typhoon or hurricane. The direction of the rotation is always the same in the same hemispheres; that is, in the northern, S.E.N.W., or with the hands of a watch; and in the southern, N.E.S.W., or in the contrary way. While a vast disc of atmosphere is thus revolving on its centre, and in reality forming a gigantic whirlwind, the whole moves onward along a certain line of progression, from which it seldom diverges beyond a few points, and which runs in a westerly direction from the equator towards the poles, being N.W. in the northern, and S.W. in the southern, hemispheres. Thus a person looking westward, on the equator, at Sumatra, would find the storms on his right curving towards India or the Bay of Bengal, and on his left rushing S.W. or in the direction of Mauritius. It is impossible to notice, even in a brief manner, all the important features of gyratory storms, such as the incessant rain, electrical discharges, and confused sea, raised by the "contending winds."

From a careful examination of all the particulars connected with the late Gale on the Malabar coast, I am fully satisfied that it was a revolving and progressive typhoon, obeying the laws which have just been alluded to as governing such phenomena in the northern hemisphere, with this peculiarity, that its path, instead of being N. Westerly, like those traced by Mr. PIDDINGTON in the southern part of the Arabian Sea, was much more northerly, and nearly following the line of coast from Cape Comorin to Kurrachee. The central track

appears to have been about 50 or 60 miles from the land, with one segment of the circle embracing the Ghauts, and the other the Laccadive Islands. In the following paragraphs it will be our object to furnish a brief abstract of the facts from which these conclusions have been drawn. To give all the details in their undigested form is out of the question on the present occasion, but those who take a more than ordinary interest in the subject may rest assured that they shall be laid before the public in another place.

From the 5th to the 10th of April severe thunder-storms and unsettled weather prevailed at Ceylon. However, the first indications of stormy movements in the atmosphere, in the form of a gyrating mass, were observed about the 12th April in the neighbourhood of Ceylon, where it was blowing a heavy gale from East, both at Colombo and Trincomalie. The ketch *Ceylon Island* when within 26 miles of Colombo had the "wind S. S. E. to E. S. E., *very violent*, the sea high, and much rain fell," which obliged her to stand off to the westward. On the same day the *Buckinghamshire*, in Latitude 5° 41′ N., Longitude 68° 38′ E., had "a steady breeze at N. N. W." On the equator, it is known that westerly winds prevail at that season.

On the 13th April, the *Ceylon Island* appears to have had more moderate weather after she ran N. W.; but the *Buckinghamshire*, as she steered to the N. E., and at noon was in Latitude 7° 11′ N., Longitude 70° 49′ E., found the wind still at N. N. W., but increasing to "fresh breezes, and cloudy weather with lightning all round." The latter vessel would appear to have been entering the western side of the stormy circle. We also learn that "at the Neilgherries the rain and the wind commenced there with great violence on the 13th," and elsewhere we find that it was easterly. From Trichinopoly, Madura, and other places, similar accounts were received.

On the 14th, the circular direction of the storm is traceable over an immense tract of land and sea. At Trincomalie the gale blew from *South* to *East*; near Colombo, it was *East* by *South* to S. S. E. At Aleppee also the gale was beginning at S. E. to East. Over the southern part of India *Easterly* winds were prevailing. About 400 miles to the westward, in Latitude 8° 18′ N., Longitude 72° 56′ E., the *Buckinghamshire* had "squally weather, *constant rain*, and much lightning," along with a *northerly* breeze. The usual westerly winds near the equator appear to have been blowing and extending northward

after the focus of the storm. In 5° S., Longitude 57° 57′ E., the *Zemindar* had S. W. winds, with "a heavy swell from S. E." Between the position of the *Buckinghamshire* on one side and Ceylon on the other, we may infer the existence of the centre of the gale, although we have no information of any vessel having been in that tract of ocean excepting those whose fate has been surmised as indicative of very bad weather.

On the 15*th*, it is said to have been "very windy" at Colombo. The direction is not ascertained, but there could be little doubt that it was about S. E. to S. S. E., as we find from good observations that at Colombo on this day a heavy gale, with lightning, thunder and rain, was blowing from *E. by S.* with a force of 6·2 pounds (a "great storm"); and off Cape Comorin the *Ceylon Island* had it "blowing tremendously at *S. E.*, and the vessel, under bare poles, running before it." On the Neilgherries, at the Dodabetta Observatory, it appears that *hourly* observations only gave a variation from *E. by N.* to *E.* ½ *S.* in the 24 hours, but the gale had a pressure of 10 pounds on the square foot. In the open sea to the westward of Cape Comorin, the *Buckinghamshire* at noon, in Lat. 9° S., Long. 73° 4′ E., had "fresh N. N. E. gales, severe squalls, a heavy sea, accompanied by incessant heavy rain, thunder and lightning," and in the course of the preceding night "split her foretopsail, foresail, and mainsail." Along the Malabar coast the gale was commencing at Cochin and Calicut, and the *Faize Rubahny* "in getting to the southward," after light airs or calms and hazy weather, "caught a breeze at S. E. about noon when in Lat. 12° 18′ S.," and her log-book records a "*confused* sea" to have been experienced—the usual harbinger of a rotatory storm before the wind even had set in.

Thus, as far as the facts in our possession extend, they shew a severe gale blowing from south, by east, round to north, and it is only from want of information that the fourth side is not determined; and, regarding this, we have not a single bit of evidence tending to invalidate the natural inference of a complete circle having been established; while argument, deduced from the known law of the prevalence of the true westerly monsoon at the season in question, would confirm our opinions.

On the 16*th*.—The revolving character of the storm as it travelled along the coast, is still more clearly developed on this day, as we have satisfactory observations from every quadrant of the tempest's circle.

At Colombo, it was reported to have been "stormy, rainy, and cloudy," and at Trincomalie it blew a gale which veered from south to *S. W.* with a force of 4 pounds on the square foot, the sky "overcast, with lightning, thunder, and rain."

About 30 or 40 miles from Cape Comorin, the *Ceylon Island* had tempestuous weather, with the wind blowing at *S. E.* to S. S. E., and in the course of the day "lost the mizen topmast, crossjack yard, and had all the sails blown away." This little vessel, both on this and the previous day, had been "scudding right before it under bare poles": we must therefore conclude that the sails were carried out of the gosgets,—an accident that can only happen to well stowed sails by a severe hurricane. At Cannanore and Tellicherry the gale was setting in at E. S. E. and *S. E.*, "with one continuous shower of rain, vivid sheets of lightning, and dreadful claps of thunder"; while the *Faize Rubahny*, in Lat. 11° 19′ S., near the coast, had a moderate gale at E. S. E., with a very high sea, hazy weather, and some rain. She was under single-reefed topsails, and, in steering southward, met such a heavy head sea as to cause her "to pitch away the flying jibboom and spring the mainmast."

On the western border of the storm we find the H. C. Steamer *Sesostris* running to the eastward and finding the wind at N. N. E. gradually increasing to a gale, and "a long swell from the S. E." was experienced when in Lat. 13° 15′, Long. 70° 28′ S. It is also noticed in the log-book, that there was "a very dark threatening appearance to the eastward."

About 200 miles south-east of the *Sesostris* we find the *Buckinghamshire* to have been in about Lat. 9° S., Long. 72° 58′ E., with a hard gale at north by east, and *north*, attended "by a very high sea and constant rain." The vessel (a 1400 ton ship) was under double-reefed topsails, with the foresail furled and the royal yards on deck,—all indicative of bad and threatening weather.

On the Neilgherries, at the Dodabetta Observatory, the gale was E. S. E. with an increasing force, which at noon, on this day, was 18 pounds on the square foot. The wind had gradually veered from E. ½ S. to E. S. E., the sky overcast, and incessant rain descending.

At Madras, the wind was *southerly* and light, with cumulous clouds and some rain. At Calcutta, it was *east*, veering to south, "cloudy and thundering." At Bangalore, *S. E.*

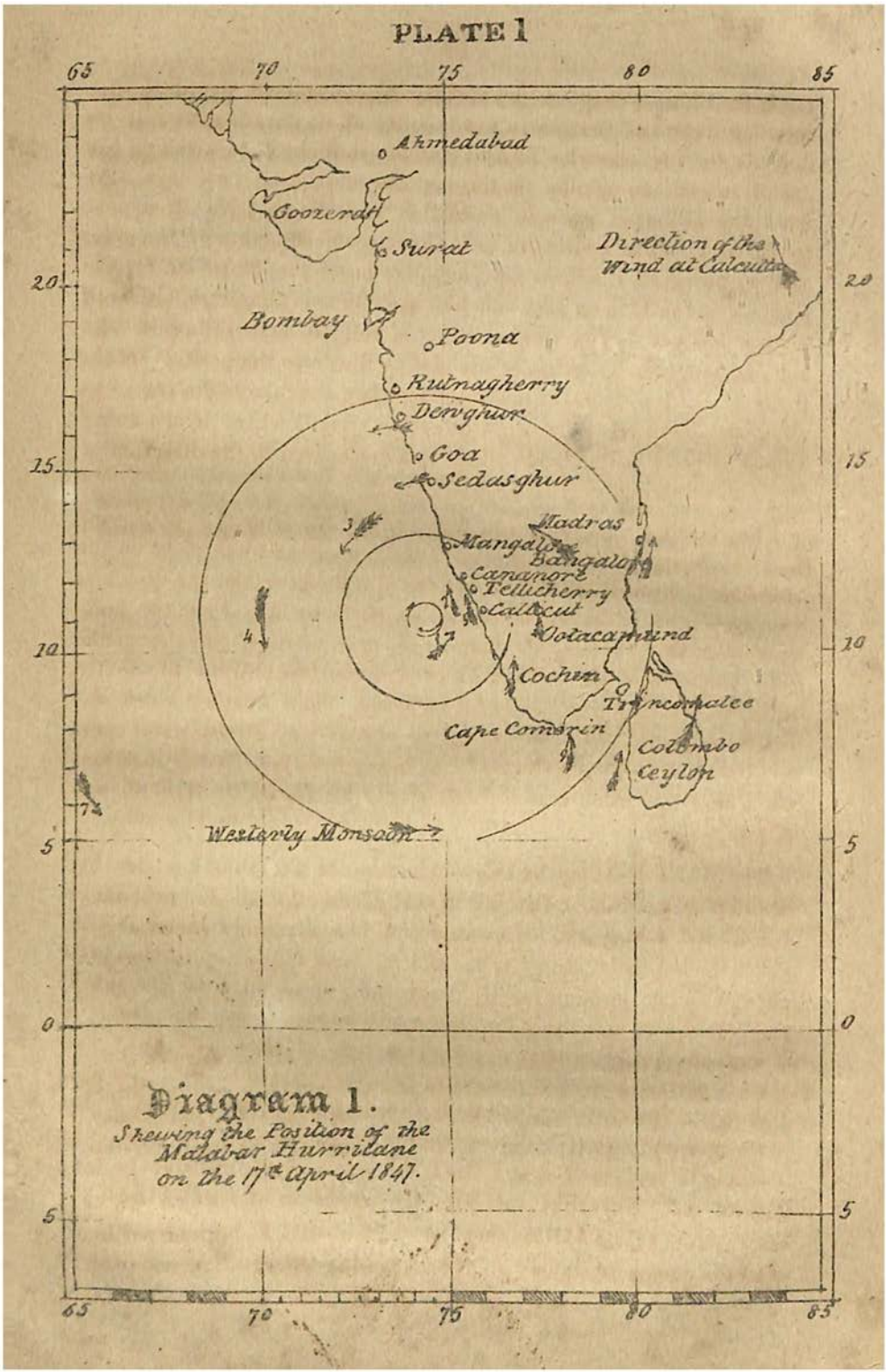


PLATE 1
65
70
75
80
85
20
15
10
5
0
Ahmedabad
Goozerath
Surat
Bombay
Poona
Rutnagherry
Devghur
Goa
Sedasghur
Mangalore
Tellicherry
Calicut
Cochin
Cape Comorin
Madras
Bangalore
Camanore
Pulicat
Cuddalore
Pondicherry
Negapatam
Tranquebar
Tutucorin
Trincomalee
Colombo
Ceylon
Direction of the Wind at Calcutta
Westerly Monsoon
Diagram 1.
Shewing the Position of the Malabar Hurricane on the 17th April 1847.

On the 17th.—Whatever doubts may be entertained regarding the rotatory nature of the gale up to this day of its duration, it will be difficult for any one who fairly examines the subject to withhold his assent to such an opinion on this and the subsequent two days. At least the following notes in connexion with diagram No. 1, appear to me to be quite conclusive as to the circular direction of the gale, and by being so, it affords a presumptive proof that since its formation about the 11th or 12th this had been its true character, although chance has yet denied us the means of fully demonstrating it. In the diagram (No. 1) which is intended to illustrate the position of the focus of the hurricane at noon on this day, the arrows are traced to shew the direction of the wind at certain points where it was ascertained by observers on land or sea, and are curved in the direction of the wind's veering.

The *Buckinghamshire* was in Lat. 10° 20′ N., Long. 75° 5′ E., and had the storm blowing at *S. S. W.* about noon, and her place on the diagram is denoted by No. 1 arrow. In the course of the previous twenty-four hours she had been steering N. E. by E. and got two hundred miles nearer to the coast than on the previous day. In the mean time, the focus of the hurricane passed across her path to the northward, so that she was nearly in its wake. The weather which she encountered was bad—"heavy gales, violent squalls, constant rain, and lightning to the northward." A heavy head sea (N.E.) was met with, and the wind veered from *North* by *N. W.* to *W.S.W.* and *S.S.W.*

The *Faize Rubahny* had no observation of the sun, but her log would place her about Lat. 11° 30′ N., Long. 75° 10′ E., near arrow No. 2 on the diagram. The wind had been rapidly increasing in violence, but only veered from *E.S.E.* to *S.E.*, owing to the little change in her position for 24 hours, and the centre of the storm coming almost directly along the coast towards her. She had "a "very heavy gale, with a tremendous sea, which washed away the "lee-quarter boat and strained the ship fore and aft. At 8.30 A.M. "shipping heavy seas, which laid the vessel's leading blocks under "water. Ship occasionally motionless in the water. Cut away the "mainsail and maintopsail from the yards, being unable to take "them in." The ship was burying herself in the awful sea that was running; she was making two and a half feet water per hour, and the pumps constantly going to keep her afloat.

In shore of the two vessels alluded to, we find that the Steamer *Victoria,* while at anchor off Cannanore, experienced frightful weather and the hurricane from E.S.E. "In this situation the surf was "making a clean breach over her, taking with it the whole of the "bulwarks from the starboard side, filling the gig, bending the "davits, &c." Finding "the rollers to be coming in with more force, "she slipt from her anchor and stood out to sea, rolling and pitch-"ing awfully" as she passed through the surf, and hove to outside. Still "the sea was tremendous, the ship labouring heavily," and a violent gale blowing. But there is not space for a detail of the injuries which the vessel sustained on this day.

Near her, in Lat. 11° 38′ N., and within 10 or 12 miles of the coast, the *Mermaid* had the same gale, at E.S.E., and about noon "carried away the flying jibboom, fore and main-topmasts and "mizen topgallant-mast," while under close-reefed topsails.

While the ships on the coast had the tempest from *South* and *East,* those to the westward had it *North* and *West.* Thus, the *Sesostris,* (No. 3) in Lat. 13° 28′, Long. 72° 7′, had "fresh gales at "*N.N.E.,* a heavy sea and hard squalls, with much rain and con-"tinued vivid lightning. The vessel rolling heavily." At the same time the *Swithamley,* in Lat. 11° 30′, Long. 70° 15′ E., (fig. 4) had a moderate gale at *N.W.* to *W.N.W.,* with a heavy swell from *N.E.* It was squally, and much lightning and thunder were experienced, while heavy masses of gloomy clouds covered the eastern half of the sky. The vessel was under double-reefed topsails.

Off Cape Comorin, the *Ceylon Island* had a *S.W.* gale, and was scudding under bare poles. Her place on the diagram is No. 6.

At a distance from the centre of the hurricane, the winds, as far as we can collect from detached information, were perfectly conformable to the vast whirlwind which they embraced. Leaving Aden, the H. C. Steamer *Auckland* had *N.E.* winds; in Lat. 70° S., Long. 57° 12′ E., the *Zemindar* had a *N.N.W.* breeze; at Ceylon, and Madras, South and S.W. winds; at Bangalore, they were S.E.; and at Bombay, light unsettled breezes at S.E. to N.E.

Nearer to the focus of this great circuit, we have the most complete information relative to the hurricane from the Observatory at Dodabetta, where, by a series of hourly observations, it appears that the

PLATE 2

Diagram 2

Shewing the position of the Malabar Hurricane of April 1847 at noon on the 18th of the Month

wind veered from E.S.E. to South or S.W., but was somewhat unsteady at the latter point; but when at S.E. its force was equal to a pressure of thirty pounds on the square foot! for the space of three hours.

From numerous places along the Malabar coast, we have a heap of information before us, all strongly corroborating the facts adduced in favour of a rotatory direction in the gale; and its devastating effects on the Coast and Laccadive Islands have already been laid before the public in many interesting notices in the *Bombay Telegraph and Courier.*

While the storm raged with such fury on the southern part of the coast, at Poona the weather was hot, sultry, and threatening. It was only on the evening of this day, or a few hours after noon, at the period to which the preceding remarks are referrible in order to render them simultaneous, that a fresh *easterly* wind set in at this place, and heavy massy cumulous clouds were hanging on the southern horizon, pouring out electricity so unceasingly as to keep up a steady and lurid illumination of the mountains in that direction. A few showers occurred, and ·57 inches of rain fell.

On the 18*th.*—For the purpose of shewing the path and progression of the tempest on two consecutive days, a second diagram (No. 2) has been projected, in which the course of the wind at different points is laid down in accordance with the information in our possession. It will be seen at a glance, that after a lapse of 24 hours, during which the stormy mass of atmosphere had moved along the coast from Lat. 11° S. to Lat. 14° 30′, the revolving direction is perfectly evident. Circumstances not under my control prevent me from giving a more complete series of these diagrams, as they are always much more useful in conveying a correct notion of the gale than pages of letter press.

We now discover that S.W. winds were blowing off Cape Comorin, where a few days before they had been at N.E., or the opposite quarter.

The H. C. Steamer *Sesostris* (No. 3) was well to the westward of the more violent part of the typhoon, but still she had bad weather, in Lat. 13° 55′, Long. 71° 13′, with the wind *North,* and "a heavy "sea rising in pyramidal masses."

The *Swithamley* (No. 4) was in Lat. 12° 22′ N., Long. 70° 15′ E., under double-reefed topsails, with a gale at *N.W.* to *W.N.W.*

The *Mermaid* (No. 8) was in Lat. 13° 52′ N., and about Longitude 74° E., with the hurricane decreasing at *W.S.W.* In the course of the previous twenty-four hours, this unfortunate vessel, after having lost her topmasts, was obliged to cut away her mizen mast; and with five feet water in the hold, and the pumps constantly going, she was compelled to run N.W. before the "increasing gale (at South) ac- "companied by heavy rain, thunder and lightning," and a tremendous sea running, and causing the ship to labour and roll heavily. During the twenty-four hours the wind veered from S.E. by South to W.S.W., and the Barometer was down to 29.40.

In shore, the *Victoria* (No. 5) was lying to, drifting with a "*Southerly*" storm along the coast from Cannanore towards Mangalore. She had the Barometer at 27.70, and "strong gales with "heavy rain, severe squalls, and an increasing swell, caused the vessel "to labour greatly."

The *Faize Rubahny*, (No. 2) at noon, was in Lat. 15° S., and Long. 73° 28′ E., with the storm at S.E. to *South*. Since the 17th, she had been scudding before it to the Northward till 6 A. M., when she was hove to. Her log-book conveys a fearful picture of the state of the weather, and of the injuries done to the vessel by "the violent "squalls and tremendous sea," while the water was entering her sides at the rate of thirty inches per hour. The topsails were blown out of the halt-ropes, the quarter boat washed away, and the long boat carried out of the chocks.

In the course of the twenty-four hours ending at noon on this day, the *Buckinghamshire* (No. 1) had been scudding N.N.W., between the focus of the storm and the land, and was running in a direction nearly parallel to that of the storm's, but the line of coast obliging her to keep a good offing, her course was necessarily changed to N.W., which gradually brought her nearer to the greatest danger; and as her speed appears to have been greater than that of the progressive movement of the focus, she arrived nearly in front of it, at noon, when, in about Lat. 15° 10′, Long. 73° E., she had the hurricane from *S.E.*, and "with the gale blowing furiously, and veering to the east," the fore and maintopsails, and foresail, were blown away.

As the very focus of the gale passed over this fine vessel within a few hours after noon of this day, we think it better to give a few extracts from the log-book, as likely to convey a truthful idea of the nature and force of the centre of a disc of atmosphere in violent gyration. This, properly speaking, ought to have been recorded under the head of next day, as we have adopted nautical and astronomical time for the purpose of illustrating the diurnal progression of the gale, but we think it will be more *effective* here :—

"At thirty minutes P. M. the ship broached to. The mizenmast "was cut away, and the vessel kept before the gale. At forty-five "minutes P. M., the wind increasing to a perfect hurricane. "At one P. M. the foremast fell over to starboard. A most "furious gust blew away the mainmast near the deck, and tore away "the quarter boats, the *starboard or large cutter flying across the* "*poop*. The violence of the wind was indescribable; everything "exposed to its fury being blown away. The poop ports having been "forced in by the strength of the wind, the *bulkhead of the cuddy* "*was also blown down*, destroying the Barometers and everything in "the cabin. The ship labouring excessively, and everything on deck "adrift or destroyed, &c. The crew unable to stand on their legs "or to hear one another speak, and exposed to great danger, from "the stunning force of the wind. The fore and mainmasts got under "the ship's bottom, and the mizenmast endangering the rudder; all "violently tearing off the copper.

"At 2 P. M. *it suddenly fell calm*, but the sympiesometer indicated "no favourable change, *continuing as low as* 28·08. During the calm, "got the wreck of the masts cut clear of the vessel. *The ship* "*covered with aquatic birds*, of which thousands were dying on the "deck. About 4 P. M. the wind that had ceased at *E.S.E.* or *East*, "began to blow with equal fury at *West North West*. The ship "was again quickly enveloped in the sea, and laboured with a violence "that nothing could resist. At 9 P M. wind abating, and the sym- "piesometer at 28·96. Three and a half feet water in the hold. At "midnight the gale moderating at West, and the sympiesometer "at 29."

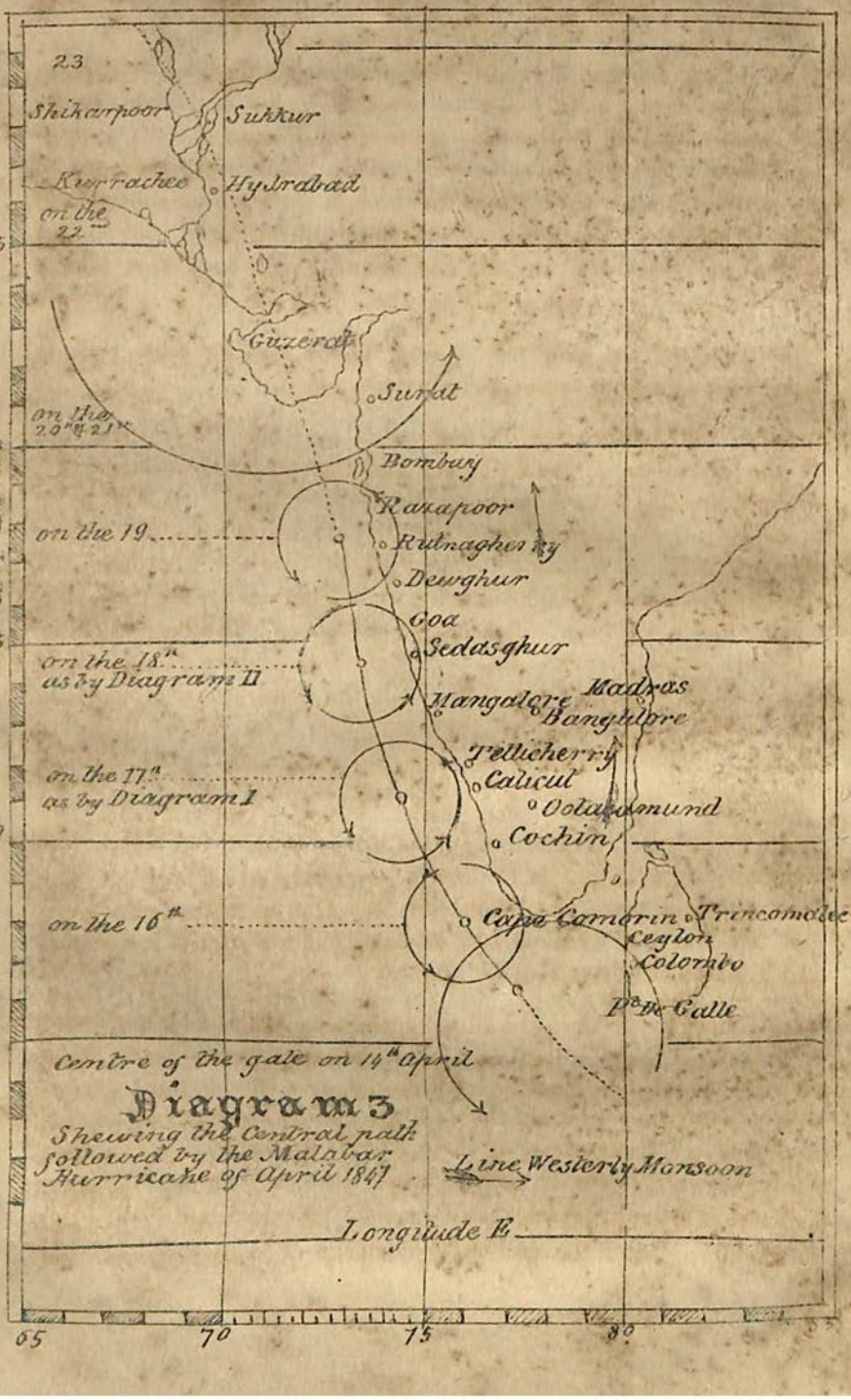
The terrible effects of the vortex of a hurricane on a 1,400 ton ship are thus vividly pourtrayed in the simple but effective words of an eye-witness. The increasing intensity of the wind, suddenly termi-

nating in a calm of two hours, and again rapidly bursting over the vessel with all it pristine wrath, from the very *opposite* point of the compass, are all so characteristic of revolving gales, and so uniformly met with at their centres, in the Atlantic, Indian, and Pacific oceans, as to constitute one of the most remarkable laws which belong to their phenomena. It has been truly said, that there is something in this strange stillness of the atmosphere far more appalling to the seaman than the overwhelming force of the typhoon that surrounds it. The wind ceases; a noble vessel, shorn of her masts and left a mere wreck, is tossing on the broken waves, or half buried under the pyramidal masses of sea raised in mountainous heaps, not a breath of wind to steady the reeling hulk; while the barometer stands fearfully low and tells of another and coming conflict with the tempest. Off Mauritius, the *Exmouth*, when in one of those calms at the middle of a hurricane, after being enveloped in dark low masses of cloud for several days, found the sun break out for a few minutes, but the mercury in the tube of the barometer sunk below the open part of the wooden frame, and till its subsequent rise the Captain suspected that the glass was broken; yet in half an hour more the wind was again blowing with terrific force from the *opposite quarter*.

To return, however, to our subject, and examine the state of the winds and weather at a distance from the centre in which the *Buckinghamshire* was sustaining so much damage, we shall find everything tending to show a vast circle of atmosphere in rotation. In Lat. 8° N., Long. 60′ E., the *Zemindar* had west winds. At Ceylon they were S.E. to S.W.; at Madras, S.W.; Bangalore, S.E.; Calcutta, South to S.E.; at Deesa, N.E. to S.E.

Nearer to the focus, the *Ceylon Island*, (No. 6) in Lat. 9° 14′ N., on the coast had S.W. winds, getting less severe as she dropped behind the gale. At Dodabetta, near Ootacamund, the gale was still blowing with a force of ten pounds on the square foot, and veering from *S. by W.* to *S.W.* At Cannanore and Sedasghur, the gale "had got round to the monsoon quarter." On this day the storm was moderating on the Neilgherries at *S.W.*, and commencing at Belgaum and Rutnagherry at *N.E.* At Mahabuleshwar, "the sky "assumed a threatening appearance, the sun became completely ob- "scured, and towards evening a storm set in, the like of which had

PLATE 3


23
Shikarpoor
Sukkur
Kurrachee
Hyderabad
on the 22
25
Guzerat
Surat
on the 20th & 21st
20
Bombay
Ratnapoor
on the 19
Rutnaghery
Dewghur
Goa
Sedasghur
on the 18th as by Diagram II
Mangalore
Madras
Bangalore
Pellicherry
on the 17th as by Diagram I
Calicut
Oolatamund
10
Cochin
on the 16th
Cape Comorin
Trincomalee
Ceylon
Colombo
Pt de Galle
5
Centre of the gate on 14th April
Diagram 3
Shewing the Central path followed by the Malabar Hurricane of April 1847
Line Westerly Monsoon
Latitude North
Longitude E
65
70
75
80

"not been seen at this season of the year by the oldest inhabitant of "the Hills."

At Poona, the first signs of an approaching gale were remarked. The forenoon was calm, but a low stratified haze was spread over the sky, and, as the wind gradually set in from *East* to *E.S.E.*, it deepened into a heavy dark canopy of clouds. The refracted rays of the setting sun, as they struggled through the opening among the heavy masses of suspended vapours, threw a wild, lurid, and almost portentous, glare over the sky and country, such as I have always seen to precede a hurricane at Mauritius.

At Bombay, the gale was setting in and veering from S.E. to N.E., with a force of two or three pounds.

On the 19th, the vortex having passed over the *Buckinghamshire,* on the afternoon of the 18th had advanced as far as Rutnagherry, where it appears to have developed its unabated force. At that place it is said to have been a "most dreadful hurricane," the wind blowing at E.N.E. to N.N.W., "during which time the wind was fear-"fully violent, bearing everything before it,—several houses, trees, &c., "being blown to atoms." "After the winds had blown most furious-"ly from the abovementioned points for four hours continuously, it "commenced blowing from S.W., when the clouds were brought up "in fearful succession from the sea. The rain poured down in "torrents. The hurricane assumed the very acmé of its violence "between the hours of 9 and 11 o'clock on Monday (19th)."

At Saigur and Razpoor rivers, the wind was East and E.S.E. At Severndroog, a strong N.E. breeze prevailed, and during the day increased to a gale. At Bombay, it was blowing between E. by N. and N.E., with a force of four or five pounds;—the sky overcast, and it was raining steadily.

At Poona, the weather had all the appearance of a passing hurricane, such, at least, as usually occurs in countries subject to them. The force of the wind at East and S.E. would only have reduced a vessel to close-reefed topsails; but the dark gloomy sky, fierce gusts, and incessant rain, borne horizontally along, and dense stratum of clouds resting on the earth, were all indications of the true nature of the gale. I stated to several persons, that if ever a typhoon visited the Dekkan the weather shewed the passage of one near us. At Belgaum, and

Mahabuleshwar, the storm appears to have been *nearly* from the same direction as at Poona.

At every point around the vortex, from whence information has been procured, we find the winds conforming to the progressive circle. The *Swithamley*, in Latitude 14° 39′ N., Longitude 71° 52′ E., had them blowing at *N.W.* to *West*, and *a heavy N.E. sea.*

The *Sesostris*, in Latitude 13° 28′ N., Longitude 73° 14′ E., had West and *S.S.W.* winds, with a *heavy confused swell from N.W.*, passing squalls, and the vessel rolling heavily. The *Buckinghamshire, Faize Rubahny, Mermaid,* and other vessels on the coast to the southward or in the wake of the vortex, all agree in recording N.W., West, and S.W., winds as far as Ceylon, and in Lat. 7° 50′ N., and Long. 58° E.—I have failed in obtaining any information regarding the winds and weather in Guzerat and Scinde, except at Deesa, where they were N.E. to S.E., and moderate. At Bombay, the storm was East, N.E., and N.N.E.—of a force of five pounds.

From this date we have no means whatever of tracing the central tract of the storm with any degree of certainty. That it passed near Bombay to the eastward or westward, is all that we know. One account (in the *Bombay Times*) says that it came "first from South-east, a most "unusual quarter, and then settling down to South-west, as during the "best established periods of the monsoon." This would lead us to infer that its vortex passed to the westward of the harbour ; and almost all other accounts, as far as they go, tend to confirm this opinion. On the other hand, the observations made every two hours at the Colaba Observatory, describe the wind as having veered from N.E. by N. to N.W. and W.N.W. By this, and we must place reliance on it, it is evident that the central part of the storm was to the eastward of the Observatory. But as the force of the wind does not seem to have been at all equal to that previously experienced near the focus, it is probable that the latter passed at a considerable distance from Bombay. Were it not for the indication of a severe storm having successively passed over Surat, Ahmedabad, Deesa, Kurrachee, and Shikarpoor, within a few days after, we lose all direct traces of the Malabar Hurricane, and we might conclude that it had either lost its extreme violence, steady line of progression, and specific rotation, soon after approximating to the coast at Rutnagherry, or altogether broke up.

On the 20th, as we have seen, the winds veered from N.E. to N.W. and W.N.W., at Bombay; on the coast, to the Southward of this, westerly gales, and heavy rain, with overcast sky, prevailed. At Deesa, N.E. to S.E. winds appear to have been blowing.

On the 21st, West and S.W. winds blew at Bombay, and some officers travelling from Deesa to Ahmedabad had a severe thunderstorm, with continued rain and high wind. The *Auckland*, bringing the mails from Aden, had strong south-westerly winds and a heavy S.W. swell from the 22nd to the 26th, when she was in Latitude 17° N., Longitude 66° E.

On the 22nd, 23rd, and 24th, it blew a severe gale at Kurrachee, with lightning, thunder, and heavy "rain." The roofs were blown off some of the new pendalls, &c.

At Shikarpoor on the 22nd and 23rd it blew a severe dust storm, (N.E. ?) on the former day, and on the latter it was accompanied by torrents of rain, and electrical phenomena. "The blackness of the "storm was fearful, the howling of the wilderness dreadful." Houses not only "leaked but staggered and fell down." On the 25th, the tempest had passed, and we lose all further vestiges of its destructive sweep from Point de Galle to Beloochistan.

Although no reliance can be placed on the accounts received from the country boats, in reference to the veering and direction of the gale at certain periods of the day, yet all agree that the gale commenced at *East* and ended at *West*. Several of the Pattamars were blown off the land for "three days," and it took as many more to regain the coast. That the storm travelled from Ceylon along the Malabar Coast and passed Bombay, is equally conclusive. Its tract has been laid down on diagram No. 3, on which the probable position of its centre on each day is marked by a small circle; and the succession of these point out the distances and direction of its diurnal progression till near Bombay; from whence to Shikarpoor, its path being hypothetical, it has been traced by an interrupted line. Hereafter, we may obtain information to clear up this doubtful subject. Had there been as many vessels between Bombay and Kurrachee as in the opposite direction, we should have had something to guide us: at present there are nothing but vague newspaper reports, received from outstations.

I must defer the comments which naturally present themselves to our mind regarding the Barometrical condition of the air, deposition of vapour, electrical phenomena, velocity of the wind, state of the sea, and other equally interesting points in the Theory of Storms, and which have far more attraction in an abstract point of view than the dry repetition of facts which has just been concluded. So far we have altogether adhered to a relation of the circumstances which tend to exhibit the revolving nature of the gale, its extent, line of progression, and daily rate of travelling along the coast, as bearing on the practical object of all such inquiries,—that of enabling vessels to shun similar danger in future.

POONA, *3rd August*, 1847. ALEXANDER THOM.

Additional Comments on the late Malabar Hurricane of April, 1847.

IN the preceding stages of this investigation, our view has been wholly directed towards the practical advantage likely to accrue from a knowledge of the Rotatory Gales that occasionally visit the Western Coast of India. If great precision has not been attained regarding the late Malabar Hurricane, we think it has, nevertheless, been shewn to have unfolded itself in all the terrible majesty, and with the integrity and permanency of action, which belong to similar phenomena in other regions of the globe. The extent of the circle, the direction of its rotation, path, and rate of progression, are the points of most vital importance in navigation; and, generally speaking, the sea and sky will not fail to give forth unerring indications of the proximity of a tempest in ample time to enable the vigilant mariner to shun the passing or approaching danger: or, if hampered in a narrow channel, to use early precautions to meet it.

In a purely scientific point of view, there is very little to add, on the present occasion, that can be considered as exact; for the various extracts, notes, and scraps of information, before us, rather point at general principles by their concordance in the aggregate than by any separate importance which they possess. To the lovers of abstract knowledge, we are inclined to offer a few observations on the relation between the various phenomena usually developed during a circular storm and their probable connexion with the primary causes,—more, however, for the purpose of exciting an interest in the subject in the minds of those who may hereafter have opportunities of forwarding

the science of storms by their observations, than from any idea of being able to advance it by our present limited sources of information.

If, as there is daily more reason to believe is the case, the intestine action of a disc of atmosphere resting on the earth, and in violent gyration, is always obedient to the same laws, manifests the same signs, and is always followed by similar effects, it is not illogical to say that if a part is found to be perfect, the existence of the whole may be inferred with as much certainty as in the case of organized forms of matter. Hence, with a previous knowledge of the theory of storms within the tropics, the evidence derived from any one of the coasting pattamars, as given in the appendix to this paper, would alone have been deemed conclusive with regard to the late gale having been rotatory and progressive. The providential escape of so many of these clumsy and ill-managed country craft, is perfectly wonderful. It would appear that this depended on the fact of the approaching storm, beginning at East, driving these helpless vessels from the land and carrying them to the westward for "three days," and in as many more again throwing them on the coast.

At a fixed point on land, a series of correct and hourly observations, such as those made at the Observatory of Dodabetta [a copy of which is appended to this paper,] cannot fail to detect the true nature of a passing hurricane. Even at the distance of the Neilgherries from the path and centre of the storm, we find the wind gradually veering in conformity with the bearing of the centre, with a concomitant increase of its force, and descent of the mercurial column, till the focus arrived at the nearest distance, after which both resume their original state in a like space of time. It is obvious that the eastern segment of the hurricane passed over Dodabetta.

Path of the Storm.—The *central path* of the Hurricane seems to have been nearly N.N.W., or parallel to the western coast of India, till it reached the neighbourhood of Bombay, when it would appear to have turned to a due north course, crossing Guzerat and Scinde. Much obscurity rests on the latter part of its career, from an almost total absence of accurate observations on the force and veering of the gale. It appears either to have been greatly modified in violence when sweeping over Bombay, or its centre must have passed at a considerable distance east or west of it. The latter surmise is the most natural, as we have satisfactory proofs of its unabated fury at different

points of its course as far as Shikarpoor and Sukkur. The tract of ocean near the South-west end of Ceylon would seem to be the place where the stormy commotion first acquired a defined form; from whence it travelled Northward along the middle of the channel formed by the Maldive and Laccadive Islands on one side, and the coast of Ceylon and India on the other.

On the latter, its devastating effects are well known; and on the former we learn from the private letter of a friend that "the hurri-"cane being from the East and N.E., the sea washed over a large "portion of the Islands. Two were nearly totally destroyed. The "whole population had been forced to escape from them, and on one "island alone the loss of cocoanut trees amounted to twenty thou-"sand." The gale was partially felt among the Laccadives: the easternmost, in all probability, suffered most. We also see by the *Bombay Times* (18th August,) that several of the Maldives were overflowed by the sea, and the inhabitants had to escape in boats; and are stated to have been at sea for many days, suffering great privations, before they reached the neighbouring islands.

Diurnal Rate of Progress.—The *diurnal progression* of the storm may be calculated from the successive positions of the vortex at noon. Having its formation to the Southward or S.W. of Ceylon, its onward movement was scarcely perceptible; but after the 14th, this may be calculated to have been nearly as follows—viz.

Date.		Distance.		Direction.
From 14th to 15th	108	miles, or $4\frac{1}{2}$ miles per hour.		N.N.W. $\frac{3}{4}$ W.
16th	129	$5\frac{1}{3}$	„	N.N.W. $\frac{3}{4}$ W.
17th	205	$8\frac{1}{2}$	„	N.N.W. $\frac{1}{2}$ W.
18th	220	$9\frac{1}{2}$	„	N. by W. $\frac{1}{2}$ W.
19th	160	$6\frac{2}{3}$	„	Northerly.
20th	140	$5\frac{5}{6}$	„	„
Near Shikarpore 24th	480	5	„	„

The distances from 16th to the 20th, are very near the truth, but from the latter to the 24th, when the focus was in the vicinity of Shikarpoor, we have assumed that it followed a due northerly direction, till its real path be ascertained.

It is quite impossible to define the limits of the hurricane, or to measure its diameter, because, as in other cases, the violence of the wind

apparently decreases from the centre towards the exterior in such regular gradation that one vessel will be lying to under bare poles near the former position, while another will be carrying top-gallant sails at the latter; and others will be under canvas according to the intermediate distances which they may chance to occupy between the two. Perhaps this comprehensive view may be objected to by rigid sticklers for the accepted meaning of the terms storm, hurricane, and typhoon. Yet, scientifically considered, we fear there is no alternative but to speak of the whole mass of atmosphere involved in a circular movement round a stormy vortex, as one phenomenon, whether as a gentle breeze at the periphery or blowing with the violence of a typhoon near the focus,—provided these are in conformity with the common centre. It certainly would be a far more easy task to coin a word expressive of the whole, than to explain the nature of the connexion that clearly exists between the external and internal parts of a gyrating disc of air. It is not the least curious part of the subject, that at 800 or 900 miles on every side of the moving focus, the atmospheric currents were blowing round it with greater or less strength and steadiness, and apparently little influenced by land or sea, lofty mountains or jungly plains.

Thus, while the stormy centre was skirting along the west coast of India, Northerly winds prevailed in the Arabian sea; Westerly, near Ceylon and the equator; Southerly and S.E., in the Bay of Bengal; and Easterly, in Scinde and upper Bengal. From whatever intermediate point, around or within this vast circle, we have any account of the wind, it is found not to have veered more than a point or two from its relative direction to the common centre, except near the coasts, where the land and sea breezes occasionally disturbed its uniformity. The diameter of the most violent and dangerous part was not much more than two hundred miles, while that of the great circuit within our cognizance was nearly fifteen hundred miles. In its early stages, however, it appears to have embraced the coast of Ceylon on one side, and the Maldives at the other.

Focus.—With regard to the *central calm*, or focus, that appalls the sternest mind far more than the wildest fury of the hurricane by which it is encircled, we have little information beyond the fact of its existence. When it passed over the *Buckinghamshire*, on the afternoon of the 18th, its diameter appears to have been about nineteen miles; assuming that the storm was travelling at the rate of nine and

a half miles per hour on that day, and the calm lasted two hours, according to extract from her log-book: and, as the gale re-commenced exactly at the opposite point from which it had suddenly died away, it is obvious that the centre passed directly over the vessel. The dimensions of this area, within which the "stormy winds" are so strangely hushed, coincides almost to a mile with those of the foci of the hurricanes which visit the Mauritius and its neighbourhood, and proves, by this distinctive and remarkable feature of rotatory gales, their perfect similarity in both hemispheres. There is reason to believe that this focal calm is most extensive and imperfectly defined during the formation of a hurricane near to the equator; and that it is only after the atmospheric currents acquire a circular movement at its circumference that the space becomes contracted to ten or twenty miles, and finally closes with the termination of the vortical force of the gale. It is more than probable that the central calm narrows and expands at different periods of the storm's duration; and as much obscurity exists regarding its passage over Bombay, we are inclined to think that there was a temporary abatement of the violent rotation and a dilatation of the focus, and that towards the tropic it again displayed its terrible powers.

Fall of Rain.—*Rain* is almost invariably a concomitant of circular gales, and during the Malabar storm we hear of its having fallen in "complete deluges" along the whole of its track from Ceylon to Scinde. In consequence of the eastern segment having impinged on the land, ample details of this fact may be gleaned from the Madras and Bombay newspapers. At Ceylon, from the 4th to the 12th April there was heavy rain, often "in torrents," with thunder and lightning and an easterly wind; and from the latter date to the 21st, south-westerly winds and "showers." We also ascertain that five hundred miles westward of this Island the *Buckinghamshire* had "incessant heavy rain," with northerly wind; and from the 14th till the storm reached Kurrachee, there are ample proofs of enormous and unceasing precipitation of vapour on every side of the vortex.

A Madura letter of the 17th April says—"It has been raining the "whole week, and especially the last two days it has been perfect "monsoon weather. The river has come down *fuller than for twenty* "*years* before, and the cotton of this season will be greatly damaged." At Coimbatore, "the quantity was not registered, but it is said to have

"been fully *equal to the aggregate inches of* 1846." The weather was the same at Trichinopoly, and a *fresh* in the Cavery carried away the Bridge at that place. "Heavy showers fell at Madras between the "15th and 22nd." At Tellicherry it was "one continued shower of rain. The rivers overflowed and inundated the paddy-fields and high-roads for the distance of four hundred yards. The whole line of the Western Ghauts was marked by similar weather. At Bombay, Ahmedabad, Mandavie, Deesa, Kurrachee, and Shikarpoor, heavy rain, quite unusual for the season, prevailed.

At three different place the fall of rain has been measured, and given in the following table :—

Date.	At the Observatory of Dodabetta, 8,640 feet above the Sea.			At Rutnagerry near the level of the sea.	Poona, 1,800 (?) feet above the sea.		
	Thermometer.		Quantity of Rain.	Quantity of Rain.	Thermometer.		Quantity of Rain.
April, 1847.	In the shade. Noon.	Wet bulb. Noon.	Inches.	Inches.	In the shade. Noon.	Wet bulb. Noon.	Inches.
15th	51·3	51·	0·01	... ...	...	...	... ...
16th	54·	52·	1·14	... ...	86·	70·	0·06
17th	53·	52·7	4·75	... ...	90·	71·	0·57
18th	53·	53·	10·00	1·50	80·	68·	0·26
19th	53·	52·5	1·72	4·07	70·	70·	3·05
20th	57·	54·	0·09	10·75	74·	68·	2·87
21st	53·	46·	... ...	1·45	78·	71·	... ...
22nd	... ...	... ...	... ...	... ...	...	...	... ...
23rd	... ...	... ...	... ...	... ...	...	...	... ...
Total....			17·71	17·77			6·81

At Tellicherry, 29 inches of rain fell during the storm.

The deposition of vapour would appear to have been greatest towards the commencement of the storm. The quantities that fell at Dodabetta in the Neilgherries, and at Rutnagherry on the sea coast, farther north, are nearly the same, but according to theory we would have expected a difference of several inches instead of a few hundredths between the two places, as the proportion of vapour in the atmosphere decreases upwards in a rapid degree. The sudden and extraordinary precipitation of rain, during rotating gales, amounting on the present occasion to fifteen inches in forty-eight hours, is,

in our humble opinion, likely hereafter to be one of the most important means by which a correct solution of the whole phenomenon may be obtained.

At Dodabetta, for example, the pressure of humidity observed was equal to ·400, and if the whole of this superincumbent vapour had been suddenly reduced to the form of rain, it would only have covered the surface to the depth of 5·24 inches. But, so far from anything of this nature having taken place, it was found that notwithstanding a deposition of water from the air equal to a depth of 17·71 inches, the proportion of vapour suspended in it was rather *increased* than diminished at the departure of the stormy mass of clouds that had shrouded the mountain for several days. It therefore follows, as a necessary inference, that a continuous supply of vapour was being brought into the sphere of condensation during the "incessant heavy "rain" so invariably noticed by all observers. It is equally evident, from principles which cannot be explained, that the South and S.W. winds were the vehicles which conveyed their load of moisture, imbibed at the equator, to the stormy circle. Dry hot winds preceded the hurricane, and wet, westerly, "monsoonish," weather followed. The theory of tropical storms is intimately connected with these facts.

At every other point of the storm there is little doubt that a similar state of things might have been detected. Had we possessed any information regarding the Barometer and hygrometrical state of the air during the fall of rain at Rutnagherry, results similar to those at Dodabetta would most likely have been obtained. At Poona on the 18th the pressure of moisture was ·574 when the rain was beginning to come down, yet, although more than six inches fell between this date and the 21st, there was an excess of vapour remaining in the atmosphere, to the extent of ·100, over that at the commencement, or a pressure of ·674. At Bombay the quantity of vapour in the air was augmented from ·709 to ·934 between the 18th and 21st, when the storm was sweeping past or over it.

Velocity of the Gale.—The *velocity* and *force* of the wind are not the least interesting points in our investigation, yet on this, as on most others, we possess only casual and imperfect snatches of information, on which little reliance can be placed, but quite enough to excite a keen desire for more extensive and complete observations on the subject when opportunities may offer. At one point alone we have exact information

for calculating the strength of the tempest, viz., at Dodabetta, where the force was equal to thirty pounds pressure on the square foot, when the gale was at South-east. Now it has been ascertained that to produce an effect equal to thirty pounds, the atmosphere, of the density of 30·00 inches of the Barometer, must be in motion at the rate of 80 miles per hour. It, therefore, follows, that at an elevation of 8,640 feet, with the air reduced in specific gravity to 22·0 inches, its velocity must have amounted to 109 miles per hour, to impress on the pressure plate of the anemometer the force of thirty pounds.

Near the focus, the violence of the typhoon appears to have been irresistible, and although not actually measured by a mathematical instrument, it is possible to understand the force that caused the foremast of the *Buckinghamshire*—" a beautiful stick of eight feet in " circumference,"—to bend, "like a Malacca cane," before the tempestuous blast by which it was finally blown away. The mainmast, *upwards* of eight feet in girth, was also snapt and torn out of the vessel, and one of the quarter boats was also forced out of its securings and carried across the poop like a feather.

Electrical Phenomena.—It is difficult to collect anything satisfactory regarding the extent, nature, and duration, of the electrical phenomena developed by the hurricane. It is quite certain, however, that electricity was evolved at different points of the whirling masses of clouds, from the 4th to 24th, as these progressed from Ceylon to the Indus; and, if we may conclude from the frequent mention made of its manifestations, the probability is that it was in constant activity during the whole time. But whether it was more abundant or intense at one side of the focus than another, is unknown. At Poona, an east wind, rounded cumulous clouds, lightning and thunder, to the South and S.E., were the harbingers of the storm; but after the clouds settled down on the earth, and the rain began to fall in horizontal sheets, the electrical discharges ceased.

Loss of Pressure in the Atmosphere.—The *diminished pressure* of the atmosphere at the centre of the hurricane, as indicated by the mercurial column, cannot be precisely ascertained, but it may be inferred to have been about two inches. Before the Barometers on board of the *Buckinghamshire* were broken, they were observed to stand at 28·35—about two hours before the ship got into the hurricane's centre. The sympiesometer, however, escaped; and when they

were actually in the focus it was found to be at 28·08: but as this instrument was known to have had a difference of from ·06 to ·08 above the broken barometers, the maximum depression may be estimated at 28·00 inches. While this was the case near the middle of the storm, at the distance of 600 or 800 miles towards the circumference, the Barometer was up to 30·00,—at Madras on one side, and in Lat 6′ S., Long. 56° 58′ E., (*Zemindar's* position) on the other.

The following table, compiled, with some difficulty, and from the readings of instruments of the relative standards of which we have no knowledge, give a tolerably correct idea of the level of the mercury at intermediate distances, from the ordinary pressure at the extreme towards the centre of greatest depression.

Barometer on the 14th April, 1847.			Barometer on the 17th April, 1847.		
Places.	Distance in miles from the focus	Barometer.	Places.	Distance in miles from the focus.	Barometer.
Madras.....	486	30·00	Zemindar.....	800	30·00
Trincomalee.....	320	29·90	Madras.....	300	29·97
Colombo.....	220	29·75	Colombo.....	300	29·86
S. Buckinghamshire	200	29·72	Victoria.....	120	29·75
			Cannanore.....	100	29·64
			Buckinghamshire	90	29·58
			Mermaid.....	60	29·35

State of the Barometer on 18th April, 1847.

Places.	Distance in miles from the focus.	Barometer.
Zemindar.....	900	30·00
Colombo.....	500	29·86
Madras.....	480	29·94
Rajcote in Guzerat.....	450	29·85
Bombay.....	240	29·70
Cannanore.....	130	29·78
Steamer Victoria.....	130	29·70
Ship Mermaid.....	80	29·36
Ship Buckinghamshire.....	20	28·35
Do. in the Focus.....	0	28·00

It is impossible to attain any degree of nicety in these calculations, as there are no means of correcting, or reducing the different instru-

ments to a common standard; yet it is satisfactory to see how nearly the altitude of the Barometers at a given distance on one day corresponds with that of another; and all agree in pointing to a gradual lessening of the weight of the atmosphere from the periphery towards the centre,—or more correctly speaking, the descent is in something of a geometrical degree of progression.

We must consider the pressure of thirty inches, as observed on board of the *Zemindar* within 800 miles of the storm's centre, in Lat. 6° and 7° North, as being somewhat *above* the ordinary standard in the neighbourhood of the equator about the equinox. The daily positions of the vortex were first deduced, and from these the distances of the ship and places were computed, in order to ascertain the relative level of the mercurial column; and the general accordance of the whole tends to show that our previous calculations of the path and diurnal stages of progression were nearer the truth than was suspected. The apparent, but really trifling, discrepancies between the fall of the Barometer at the same distance on different days, or between different places equally remote, are perhaps due partly to errors in calculation or imperfections in the instruments. On the whole, however, the results coincide with all that is yet known on this head.

Influence on the Tides.—A moment's reflection will show that a revolving gale sweeping along the shores of a narrow sea, must have great influence on the currents and tides of the ocean;—and the facts quite agree with such a supposition. Captain SINGLETON says—"The tides must have risen three or four feet above the highest "spring tides, and overflowed the paddy-fields in different directions, "within about 100 yards of the barracks." At Bombay there appears to have been "enormously high tides" during the passage of the storm. It is more than probable that the state of the Tide-gauge at Colaba may be obtained before this goes to press.

A removal of the weight of the atmosphere equal to two inches of the Barometer would be followed by an elevation of the sea beneath to the extent of 27 inches. Hence a storm wave of the circular form, having its apex under the focus, was carried along with the hurricane, followed by a current in its wake. In addition to this, the circular current, caused by the winds, round the vortex, must be taken into account as also tending to heap up the sea near the centre.

On the eastern side of the focus, the wind, storm-wave, and current, were all following the same direction along the coast. Thus it appears, by a correspondent of the *Madras Circulator*, that—"At "Calicut the sea was so rough, and the current *towards the North* so "strong, that several pattimars which were anchored in the roads, "and a French ship called the *Erneste*, were obliged to slip their "cables and run out to sea. You may form an idea of the strength "of the current from the fact that the Schooner *Nymph*, which left "Cochin for Colombo, was carried away far towards the north, and, "becoming unmanageable, struck on a reef of rocks off Tellicherry, "where she is now lying a wreck."

While a body of water was thus carried along the eastern side of the Arabian sea, it would naturally have flowed to the westward in front of the storm-wave and turned to the southward beyond the influence of the gale. The H. C. Steamer *Auckland*, on the passage from Aden to Bombay, first experienced this southerly current at the rate of fourteen miles per diem, on the 25th, in Long. 62° East, and found it to continue till the 28th, when she was in Long. 72° E.

The state of the sea seems to have been such as is usually met with during hurricanes. The nearer the centre the more "cross," "confused," and broken were the waves, and, as might be expected when tossed by violent wind in angry collision, they rose up in "py-"ramidal masses," thereby increasing the danger to ships in a manifold degree. A long heavy swell seems to have extended to many hundred miles beyond the area of the storm, and ought to have told of what was going on. The *Faize Rubahny* first experienced a heavy "confused sea" on the 15th, when off Mangalore, *two days before the vortex reached her.*

Causes.—In addition to the importance of the subject as affecting the lives and happiness of a large proportion of the human race, it must be confessed that a keen and abstract interest in the theory of storms has induced us to prosecute our research in spite of not a few unforeseen and even repelling obstacles. The hope, however vain, of penetrating into the mysterious forces which set this mighty tempest in motion, alone leads us through a dry detail of almost discordant facts. The accumulation of facts is subservient to the discovery of principles, and a theory is absolutely necessary to guide us in their arrangement. It may, therefore, be permitted us, without

seriously trespassing on the indulgence of our readers, to offer a few observations on the primary causes of storms. In the Indian ocean South of the Equator, the great hurricanes which annually sweep over its waters, are formed between, and in connexion with, two great opposing currents of atmosphere, and we think the same will be discovered to be the case with those of the coasts of India. As the principles and references necessary to illustrate this cannot now be brought forward with any degree of fullness, a glance at them can alone be given.

Primary Forces of a Rotatory Gale.—The two great trade-winds of the opposite hemispheres having an easterly direction and inclination towards the equator, are separated at the equator by the Line-westerly monsoon blowing in an exactly opposite direction, and unlike the former, its direction is obliquely FROM the equator. This great westerly current, like the trade winds, varies its position with the season, being north of the equator, under a northerly declination of the sun, and south, under a southerly,—blowing N. Westerly in the latter position and S. Westerly in the former; but it rarely extends beyond 10° or 12° degrees on either side of the Line. The vicinity of Islands or Continents derange these otherwise regular winds of the open ocean.

State of the Trade Winds, &c., in the Hurricane Month.—It seems to be a general law that the *hurricane season* of both hemispheres is that in which the sun is over it, and the trade wind is pushed farther from the equator, and its place temporarily occupied by the westerly monsoon just referred to. At the outer margin of the latter, or in the space of variables between it and the nearest or equatorial border of the trade wind, the vortices of great storms, revolving in accordance with the two great opposite currents at their reversed sides, are formed, and drift "en masse" to the westward, gradually turning toward their respective pole. Thus the N.E. trade deflecting from East to North, and the S.W. Monsoon of the equator turning back against it from West to South, give the specific mode of rotation, E.N.W.S. at the Northern hemisphere; and everything exactly reversed on the Southern side of the line. With such a palpable connexion between these regular currents and their stormy movements, we cannot refrain from placing them in the position of cause and effect; even without resorting to the additional arguments which might be adduced.

Monsoons of India connected with its Gales.—The N.E. Monsoon of India is in reality a part of the great trade wind, and the S.W. is merely an extension of the Line-westerly, caused by the great deserts and central tracts of Northern India and Southern Asia, when under the calorific agency of the Line. It is during the change of these monsoons that storms occur on the coasts of India, or neighbouring seas. All the rotatory gales so carefully examined by Mr. PIDDINGTON of Calcutta, have happened in April, May, or June ; or in October and November. On the recession of the S.W. monsoon, and setting in of the N.E., during the latter month, "the Elephanta," evidently a rotatory gale of more or less violence, is always expected on this coast.

Horsburgh, in his sailing directions for this coast, notices several gales which visited the western shore of India in October and November; and refers to a severe storm that happened about the 20th April 1782, "in which H. M. S. *Cuddalore*, the *Revenge*, and several "other ships, foundered with their crews ; the *Essex*, *Nancy*, and "others, were dismasted." He also informs us that a vessel foundered at her anchors in Surat road during the same gale, "owing to the "wind, tide, and high cross sea, from southward and westward."

However difficult it may be to assign the real causes of the late Malabar hurricane, yet analogy, reasoning, and ascertained facts, all point to their intimate connexion with the conflicting forces of an extraordinarily early S.W. or equatorial wind, and those of a protracted N.E. monsoon. For some weeks before the hurricane, winds from the *Eastward* prevailed over all India as far as Ceylon, and continued to blow with more or less strength and steadiness till the centre of the storm passed, after which all accounts from Scinde to Ceylon, and from the Arabian sea, agree in shewing the presence of *Westerly* winds and weather, such as attend the setting in of the S.W. monsoon. In the northern parts of the peninsula the latter did not become fixed, although at Ceylon and about the Southern extremity of India steady S.W. winds were in force up to the end of April. But that the agencies which set the S.W. or sea winds in motion, were developed long before the period of the year when they are expected, is manifest from the fact of the monsoon having been perfectly established at Bombay by the 22nd of May, being the earliest recollected for many years.

On the other hand, it is known that a rigorous winter and protracted chilly winds in spring, indicated severe cold in the North of Europe and Asia. On this, no doubt, depended the remarkable occurrence of heavy falls of hailstones over many parts of India, on the N.E. side of the hurricane, in April, and during the setting in of the S.W. monsoon in May. For instance, at Bancoorah, on the 4th April, "several severe *hailstorms* took place. Some of the pieces "were from three to four inches in diameter: cattle and human lives "were destroyed." On the 5th, a heavy storm of thunder, lightning, and rain, took place at Colombo, and the thermometer fell from 90° to 73°; and on the same day, at Manantoddy, "a pelting *fall of "ice"* lowered the temperature from 84° to 69°.

On the 15th April, while the hurricane was raging off Cape Comorin, and the *Ceylon Island* was near its vortex, "filling with water" after having had all her sails blown away, and the crossjack yard snapt in two by "the violent gusts of wind and rain," from S. and E., we find that Calcutta and Serampore were visited by "*hail-storms,*" with the wind between N.E. and S.E. In connexion with this, we cannot refrain from quoting a few remarks "from a correspondent at Ootacamund" (on the Neilgherries) to the Bombay *Telegraph and Courier,* and dated the 17th April, who says:—"The Kondas on Mon-"day last (13th) came as it were within a giant's stride of the canton-"ment. That confused blending of forest with forest, and indistinct "grouping of the peaked hills decked out in their sombre livery of "greyish blue, now assumed the vivid colouring, the distinctness of a "new landscape, and an universal stream of light lit up those blue "mountains standing forth in bold outline against a hard blue sky; "over which hurried with racing speed thin streaks of white fleecy "clouds attended by several smaller satellites, black, wild, and ragged, "fleeing like birds of ill omen scared from their prey. Sailors would "have foretold a furious gale. Tuesday ushered in a high wind with "passing showers of rain. On Wednesday, the day of the eclipse, "the wind was blowing a strong gale from *East by South*; since the "15th it has been blowing furiously and from the same quarter, enve-"loping the country in a dense mist, accompanied by incessant rain."

Thus from Bengal to the centre of the storm, from 13th to the 15th, signs of an almost frigid N.E. current of air were obvious to observers. The logs of the *Buckinghamshire,* and *Zemindar,* show the condition of the weather on the opposite side of the vortex. One month

later, the commencement of the S.W. monsoon was marked by sharp tornadoes at Poona, where, on 22nd May, a fall of *hailstones* took place, most of which were as large as pigeons' eggs, and of the same shape.

All these facts shew that before the galè set in, the N.E. monsoon was predominating over India. The facts of an indraft of air or sea-breeze at the coasts, and calms or high winds near the heated surface of the plains, are mere local effects, confined to the very lowest stratum of air, at least till the mean heat of the earth increases to a certain degree. Over these early derangements, caused by solar agency, the Easterly currents, or great body of air, continues its course with little interruption till near the time of the S.W. monsoon. On the coasts of Scinde we have often seen the low rapid drift of light clouds carried out to sea by the easterly wind, while a gentle surface breeze was blowing inland from the westward. The masses of cold dry air borne by the N.E. monsoon, on coming in collision with the hot and humid S.W. winds from the opposite quarter, would, according to all the known laws of permanently elactic and other fluids, run into gyratory motion, mingle together, be reduced to a common temperature, and precipitate their superabundant moisture in the form of rain, or of *hail*, if this union took place near the level of congealation ;—and the phenomena would be prolonged, according to circumcumstances so variable in their nature that we cannot now advert to them.* The evolvation of electricity on such occasions is more or less remarkable according to the suddenness of the condensation, and rather appears to us to be a consequence of the change of vapour to the form of water than the cause.

Analytical comments on the late Gale.—It would be hopeless in our present state of knowledge to attempt an analysis of all the various phenomena that distinguish a rotatory gale, but certain known principles may assist in partially elucidating the complex relation that the most remarkable bear to one another. For instance, according to the laws of gravity, it follows that in a revolving mass of air with a diminished pressure of the superincumbent atmosphere near the centre equal to two inches of the Barometer, the surrounding column of the

* In the Malabar storm, from the copious fall of rain along with the East wind at the surface, it is almost certain that at a higher region of the atmosphere the hot and humid S.W. currents were blowing; while on the Southwest side of the circle the cold and dense N.E. wind was forcing itself under the N.W., and westerly, and causing those sudden squalls "coming up "against the wind" which were experienced by the *Swithamley* and *Sesostris*.

ordinary level, would press on all sides towards the focus of minimum resistance, and the pressure would be greatest on the densest layers resting on the surface of the earth, where the circular motion would assume an involute or helical direction, increasing in tempestuous gyrations as it approached the centre. For a continuance of the whole process, it is equally apparent that this centripetal tendency of the atmosphere at the base must be counterbalanced by a removal of air at the centre, by means of a focal current in a vertical direction at the point where the barometer is at its lowest range, and the stormy gusts cease to brush the surface in a horizontal direction, and cause that portentous calm which, strange to say, is the very core of the fiercest tempest. A rush of the ærial currents from the circumference towards the centre, would, even in a helical direction, restore a loss of pressure of two inches in an hour's time, and the vortical violence would be quickly ended if some agency did not exist at the upper parts of the focus capable of steadily withdrawing the ascending stream of air. In fact, the true explanation of this last cause may be considered as the key to the whole subject, but is a question that can never, in all probability, be practically determined,—its solution must alone rest on reasoning and analogy.

Height of the Rotatory Motion.—It is more than two years since we surmised that the circular motion of the atmosphere during great hurricanes extended to a much greater elevation than was generally admitted. This opinion has been now most fully confirmed by the observations made on Dodabetta, where the ærial currents were speeding round that part of the circle, at the height of nearly two miles perpendicular from the level of the ocean, and at a distance of one hundred miles from the focus, with a velocity of one hundred and nine miles per hour. Consequently, it may reasonably be inferred that far above this lofty peak the atmosphere was under the influence of the storm. The centrifugal action, consequent on revolving motion, would withdraw the atmosphere from the centre and throw it off towards the periphery. Thus, while a vast disc of atmosphere is in rotation at a level far above the surface of the earth, there must be *centrifugal action at the upper part* of the centre, where the atmosphere is light, and a *centripetal* movement among the lowest and densest strata, sweeping with vorticular violence to the focus; the strength of the latter being in the ratio of the former. The laws of hydrostatics, hydraulics, and pneumatics, may appropriately be referred to as

illustrating this part of the subject. A body of water in circular motion, as an eddy for example, exhibits the effects of centripetal action at the bottom and of centrifugal at the surface, where a concavity is formed in a degree corresponding to the rate of the motion. If the case is so in a fluid of equable density, how much more must these effects extend to a mass of atmosphere, under similar circumstances, but with its specific gravity rapidly decreasing in a geometrical ratio upwards.

Continuous causes.—The *continuous causes* of the rotatory action are due to the momentum imparted at reverse sides of the circle by two great currents of air moving in opposite directions, and pressing on the exterior of the stormy mass. As already alluded to, this seems to have been effected in the Malabar hurricane of April, by the westerly winds of the equator on one side, and the easterly monsoon near its recession on the other; the former deflecting by S.W. to South, and the latter by veering from East by N.E. to North; the permanency, strength, and direction, of the storm being dependant on the equipotence and combined action of the two, and its decadence, or irregularity, on ordinary disturbances to which both were liable, from circumstances sufficiently appreciable, but too numerous to be referred to in this paper. To one of these accidental causes of disturbance, peculiar to the season and natural configuration of the land, —viz. the vast extent of low sandy deserts of Northern India, Scinde, and Beloochistan, being heated at that period of the year to a much higher degree than the more southern parts of the peninsula, and giving rise to new currents at variance with the N.E. monsoon,—we are disposed to attribute the due northerly track of the vortex, and its less steady, strong, and well defined, movements after it passed Bombay than when on the Malabar Coast. Had the N.E. monsoon been setting in, or in its full strength, its impulse, applied to that side of the storm, would in all probability not only have augmented the violence of its gyration near the tropic but have pushed the whole mass more to the N.W., and given it the line of progression usually followed. Hence, as both the season and surface of the land combined to weaken the Easterly wind, the S.W. monsoon in its superior strength appears to have carried the vortex along the coast, and even over the western part of Scinde and Guzerat. This may also have been the case with the severe storm of 20th April 1782, which travelled up the Gulph of Cambay, and in all probability was influenced by the causes to which reference has just been made.

It will thus be seen that the primary forces which give birth to rotating storms in motion, are derived from those which are generally admitted by modern philosophers to support the trade-wind on one side, and the equatorial band of westerly winds on the other. These are the assignable causes which come within the scope of our observation, and appear to be fully adequate to the production of all the phenomena hitherto noticed during storms of a revolving nature originating within the tropics.

Suggestions on the means of avoiding Storms on the Western Coast of India.—Having pointed out the perils attendant on these whirling tempests, it may naturally be expected that some observations should be made on the means of avoiding them. However, very great caution is necessary in laying down arbitrary rules for the guidance of men who are unacquainted with the principles on which they are founded. We again repeat opinions published on a former occasion, that those who may turn to such works as these "in the expectation "of finding an easy and obvious method of escape from difficulties "hitherto nearly insurmountable, without any effort of the under-"standing or exercise of the judgment, will be disappointed." Our object has been to point out the nature of these storms, and if Commanders of vessels will only make themselves thoroughly acquainted with this, abstract instructions will be an unnecessary appendage to the subject. The question, in fact, appertains to Government and shipowners, on whom must ever devolve the real responsibility of not aiding in the extension of knowledge regarding storms, and making it incumbent on all their employés to know something of the matter. No human foresight can always guard against misfortunes, for circumstances, of so complex a nature, and so disastrous in their results as to baffle the efforts and ingenuity of the ablest and best of navigators, will no doubt occur too frequently; yet, if any means can be shewn of averting even a tithe of the loss of life and property caused by tropical tempests, they merit inquiry and a fair trial, instead of being treated as mere theories that cannot be reduced to any practical purpose.

Apart from the infrequency of typhoons on this coast, especially in April, that on the Malabar coast, by pursuing an unusual direction and impinging on the Maldive and Laccadive Islands and shoals on one side, and west coast of Ceylon and India on the other, was fraught with perils of no ordinary kind, and even if such a visitation

had been expected in the Arabian sea, it was hardly possible for ships in every instance to survive its overwhelming violence, even where there was no lack of vigilance, energy and intelligence. The tendency of the first half of the storm, by the combined influence of the wind and curent, was to drive vessels to the westward among the dangerous reefs of the above-mentioned islands; and the latter part to throw them back on the coast of India. Thus, at its setting in, the coasting craft were caught by the easterly wind, off shore, and by being swept across the path of the gale its focus passed between them and the land; while the veering of the wind to north and west, drove them round into its wake and restored them to their homes. For "three days" they were hurried from the land, and in as many more brought back to it. In the very helplessness of these country boats consisted their safety. By yielding to the commencing gale it bore them out of the more imminent danger, whereas, had they struggled against the increasing force of the wind to keep near the Indian coast, they would most likely have committed themselves to the mercy of the wind and waves, when too late to cross, but just in time to reach, the central path as the vortex was passing. Wonderful as the ways of Providence are in carrying such frail and open craft around so terrible a storm, yet there can be little doubt that too many of those whose fate must ever be unknown were destroyed under the circumstance last referred to.

To the large vessels from Bombay, bound to the Southward, whose course lay along the coast, the danger was very threatening; and, as the approaching typhoon spread itself across the channel, it rendered the ordinary means of escape most difficult. It was Scylla and Charybdis on either side, with a tempest between. There was time, but barely room, to shun the vortex, unless by having turned back to Bombay harbour. The *Faize Rubahny,* and *Mermaid,* on first finding the easterly wind increasing to a gale, appear to have kept well in with the land, so that when the vortex came up abreast of them they were at a sufficient distance to the eastward of it to avoid the most fatal part; and it was perhaps the very best thing which they could have done, if determined to prosecute their voyage: and had the storm travelled N.W., according to the ordinary laws, these ships would in all probability have wholly escaped.

Vessels meeting the Storm.—It is indeed very difficult to suggest any means of escape from such a storm as that of last April, which

clung to the Malabar coast in its northerly course, that would be applicable to all the varied circumstances in which a vessel may be placed, in reference to her distance and bearing from the centre and path of the storm, and from the nearest land or reefs,—in connexion with her navigable capabilities, propulsion by paddles or canvas, size, strength, cargo, &c. Suffice it to say, that, with the sea open to the westward, and the gale commencing from East to N.E., a ship ought to scud due west till the wind veers to North, then keep away S.W. and southerly, as the vortex will have passed. On the other hand, if the wind at East is changing to S.E., ships would do well to stand as much to the Eastward as possible till the gale is round to South or S.W. If near the coast, this must be attended by some hazard, but we suspect much less will be incurred than by lying to outside till the vortex passes over. When a vessel meets such a storm at East, and, owing to the Laccadive Islands dare not run west out of its way, she will have no alternative left but to cling to the eastern side of the channel till the wind is at South veering to S.W., when she may regain a good offing in the wake of the storm, before the westerly winds are fully established. If practicable, the most judicious step would be to return to Bombay harbour.

Much must depend on the distance of the focus from the shore. The exact bearing of this from a vessel and its path, can alone be discovered with accuracy by a previous knowledge of the laws of such phenomena. It will be too late to begin to study these at the moment when a hurricane is passing over the vessel; but to him who has the subject in his hand, a glance at the sea, sky, and barometer, in connexion with the force and veering of the wind, will, with a moment's reflection, enable him to reduce his principles to practice. When a gale increases, with the wind steady at one point of the compass, as East or E.N.E., it is obvious that the vortex is coming directly towards the ship; if veering to North on one side, or South on the other, then the centre is passing to the east or west, and the line of escape is readily discovered.

Fortunately the revolving gales of the Arabian sea generally drift N.W., by which vessels near the coast are in less danger. Supposing however, that another gale, like the one under consideration, was to visit the coast and the focus, instead of passing it at the distance of sixty or eighty miles was actually to impinge on the coast, vessels

might then keep to the westward of the vortex and escape its greatest violence without making too free with the Laccadives. Nor would the danger be very great near those reefs, because the winds would be northerly and N.W. as soon as it had passed.—So far, these comments on the means of avoiding any future and similar storms which may recur on the Malabar coast, have been wholly confined to the case of vessels going south and meeting it in their teeth, with land or shoals on both sides of the channel.

Ships overtaking the Storm.—A ship coming in contact with such a gale on its Western or Southern borders, can with great ease always keep out of harm's way. In the former case the N.E., North, and North W., winds will be available to lead her to the Southward till the veering of the wind indicates the passage of the storm to the Northward. The H. C. Steamer *Sesostris* entered the western side of the late gale, but being bound to Cannanore, the focus passed between her and the land before she got in shore. Had her course been to Bombay, she must either have hove to, or, by continuing her voyage, have been endangered by getting too near to the vortex. The *Swithamley* also got into the west side of the stormy circle, but, like a wise man, her commander, on finding the weather hourly getting worse as he kept on his course to N.E., put the ship about to S.W.; and by doing so invariably found the wind to decrease. He thus escaped the perils that lay between him and his destined port, till they passed away.

The *Ceylon Island* seems to have been on the east side of the vortex when it passed her on the 15th, half way between Colombo and Cape Comorin. This vessel subsequently followed in its wake, making a *fair* wind of the South West winds at its after half. Being a slow sailer she gradually dropped behind the gale, however. She came all the way from "Colombo to Malwan under bare poles"! A faster vessel, if not cautiously managed, might have run some danger of overtaking the gale.

As a general rule is as easy to be understood as to be complied with, vessels, after crossing the equator and bound to any of the northern parts of the Arabian sea, or the Persian Gulph, ought, on finding the Barometer falling, the wind increasing to a gale at West, accompanied by incessant heavy rain, and "a cross sea," to begin to suspect that they are running into a circular gale. By ly-

ing to, or standing away to the eastward, as the land will permit, the proximity and extent of the danger may both be ascertained and provided against.

The *Buckinghamshire* was more or less involved in the storm from the 13th to 20th, in consequence of her course being parallel to that of the vortex. On the 14th, she was in the westerly half of the circle, with bad weather at North and N.N.W., and as she neared the Island of Mincoy, the N.E. wind delayed her till the focus of the gale had passed from between her and the coast of India; and on the 17th, the gale veering to N.W. enabled her to run 120 miles to the eastward, passing through its equatorial side, crossing its wake, and getting in between it and the land of India. On the 18th, she availed herself of the strong southerly gale on the east side of the vortex, and ran along the coast N.N.W. and N.W. by N.; and current and wind being favourable, her speed was eleven to twelve miles per hour. Thus she ran up to the focus, passed ahead of it with the gale veering from S. by W. to South and S.E., and, in consequence of the jutting out of the coast near Vingorla, she was forced to keep off N.W. by W. at the very time when the vortex was assuming a northerly course and approximating the land. The result was most disastrous to this fine vessel, and, as we have seen, on the 18th, P. M., the most violent part of the tempest swept over her.

It is almost self-evident that had this ship hove to on the 18th, before she found the wind veering past South to the eastward, she would have escaped the more perilous part of the typhoon. Truth requires that this should be stated, and it is for the guidance of vessels in future, for the preservation of human life and property, that these remarks are made. But so far from attaching any blame to the officer in command of the *Buckinghamshire*, we think his conduct, under all the trying circumstances to which he was exposed, has been marked by intelligence, humanity, and zeal for the interest of his employers. He suspected the true nature of the storm, although there was absolutely no previous reason for expecting a rotatory gale at such a season. It was quite natural to avail himself of the southerly, and of course *fair*, winds at the east side of a vortical storm, and had it diverged from the land in accordance with the path commonly pursued by those noticed in Mr. PIDDINGTON'S works, all would have gone right.

But Captain MacGregor was actuated by other feelings of the most praiseworthy and humane kind. The greater part of his crew were laid up with scurvy, and, before the *Buckinghamshire* got into the gale, on the 11th April, it appears that "most of the Chinese, "and all of the Manilla, men were sick," and "*many were dead and* "*others dying*;" and on the 17th, no less than forty-nine of the crew were sick. Few require to be told that the most effective means of checking scurvey consists in fresh provisions, vegetables, and rest; and that the ravages of such a disease on board ship were to be apprehended far more than those that might possibly happen to a 1,400 ton vessel in a storm. Therefore, every effort was made to use a fair wind in running for a port almost within twenty-four hours' sail.

There is another vessel to which a very melancholy interest is attached—the H. C. Steamer *Cleopatra,* which left Bombay on the afternoon of the 14th April, bound to Singapore, with convicts, and had between 200 and 300 souls on board, since which time nothing has been heard of her. What the fate of this unfortunate vessel has been, we fear must ever remain a matter of mere conjecture, as not even a vestige of wreck belonging to her has been picked up to guide us in our surmises. It would almost be cruel to say aught to annihilate that hope which those who are deeply interested in the question, cannot yet resign, but, if we consider that the *Cleopatra* must have met the hurricane in her very teeth, and have been exposed to that frightful weather and sea which produced such crippling effects on the other ships that escaped, it is hardly credible that she should have avoided such serious damages as would have compelled her to put into some harbour on the coast,—a measure that might have easily been adopted, nay, almost forced on her, by the Westerly and S.W. gales consequent on the departure of the vortex.

It is most probable that the progress of the *Cleopatra* would be impeded by the currents and first part of the gale at S.E. if near the land, so that she would not have got near the focus of the gale till about the 17th, when it was off Mangalore. Supposing she ran along the coast at thirty miles distance from it, the increasing force of the gale at S.E. to East, aided by the storm current setting west, would, as she gradually approached the coming vortex, have driven her farther from the land, and consequently right on the central path,

when the overwhelming force of the tempest and raging sea is too likely to have caused the lamentable catastrophe so much dreaded. Had she been in shore, it is probable that she would have been seen or met by the other vessels, and that her escape would have been effected with some damage—perhaps as the *Victoria, Seaforth, Faize Rubahny, &c.*; or had she been carried sufficiently westward to be out of the path followed by the focus, she would, even if disabled, have been drifted round by the northerly and westerly winds, and, like the small country craft, have been brought towards the coast. It is a bare possibility, that if she was farther along the coast towards Ceylon than we suppose, she might have been well to the westward and swept in among the Laccadives: if so, her fate may yet be discovered.

The size or sea-going qualities of vessels cannot always be considered as a security for weathering a hurricane. H. M. S. the *Culloden* 74, and *Java* Frigate, foundered off Mauritius, while the *Harrier* Brig of War lived through the same storm. Yet in another tempest, which happened near the same place, in the following year, the *Harrier* went down, while the large ships of the fleet kept afloat Nor will science, foresight, and every possible precaution, always stave off misfortune. On board of a vessel tossed by angry winds, and half buried in pyramidal heaps of mountain waves, the wreck of a mast alongside may open a leak,—the rudder may be carried away,—a wheel rope snap,—or the steersmen be dashed from their post,—or other accidents may happen, by which the finest craft may, in a few minutes, be exposed to the most fatal disasters. These are points of seamanship with which we have nothing to do: we aim at little more than pointing out the danger, and recommending to all who can, to eschew the perils, of a stormy vortex in time, rather than to risk a collision in which nothing can be gained by a successful escape, while much may be lost in the struggle.

A. THOM.

APPENDIX.—No. I.

Meteorological Register at Trincomalie, on the East Coast of Ceylon, for April, 1847.

[Furnished by Dr. Roe, Deputy Inspector of Hospitals in Ceylon.]

Date.	Barometer.		Thermometer.		Winds.				Weather.		Remarks.
					Quarter.		Strength.				
	Max.	Min.	Max.	Min.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	
1	30·03	29·96	87	78	SW	East	1	3	B	B	
2	30·03	29·93	86	80	SW	VETOESE	1	3	B	B	
3	29·96	29 93	87	60	SW	East	1	3	BC	B	
4	30·04	29 97	86	78	SW	East	1	3	BC	B	
5	30·06	29·98	85	78	SW	East	10	3	BC	BC	
6	30·06	29·98	85	78	East	East	4	4	BC	OL	
7	30·06	29·98	85	79	East	East	03	3	OGP	OLT	
8	30·04	29 96	85	76	SW.o	East	02	3·20	OETP	BCOLT	
9	30.00	29 91	83	76	o	North	0	12	OLTR	BC	
10	30·00	29·92	81	75	Vble	East	0·41	1·23	OQETR	BCOLR	
11	29·97	29·87	79	75	EbyN	E by N	6	6	OLTR	BCOLTR	At 9. 30 P. M. strong squalls from SW.OLTR.
12	29·96	29·87	82	76	East	East	5	4	OQLTR	BCP	
13	29·97	29·87	84	76	oSW	E by S	01	4·32	BC	BOP	
14	29·97	29 90	84	77	South	E by S	3	5	BC	BC	
15	29·94	29·83	84	79	EbyS	E by S	5	62	BCM	OLTR	This is generally the most oppressive month in the year : light see breeze by day and calm sultry night. Thermometer generally 87° all night.
16	29·92	29·83	83	76	East	s to s w	01	40	BCT	OLTR	
17	29·92	29·84	83	73	StoE	E to s w	14	40	BC	OLTR	
18	29·94	29·88	82	74	SWSE	ESW	1	20	BC	OLTP	
19	29 95	29·89	84	75	SWtoS	ESW	1	3·41	BC	OLTR	
20	30 02	29 90	84	75	SW	North	21	04	BC	OULT	
21	29·98	29·88	85	77	SW	WSW	1	4	BC	OLTU	
22	29·98	29·90	86	77	SW		3	3	BC	BC	
23	29·96	29·87	87	78	SW	NE by s	3	3	B	B	
24	29·97	29·91	87	78	SW	SW	4	4	B	B	
25	29·97	29·88	87	76	SW	SW	45	4	B	B	
26	29·94	29·86	89	77	SW	SW	4	5	B	B	Perfect S. W. Monsoon weather, although early.
27	29·90	29 86	89	77	SW	SW	56	56	B	B	
28	29·92	29·86	89	79	SW	SW	5	54	B	B	
29	29·91	29·85	88	79	SW	SW	5	53	B	BC	
30	29·95	29·87	87	79	SW	ESE	4	13	BC	B	

Strong movements.

Note.—B, denotes Blue sky; C, Cloudy; D, Drizzling rain; G, Gloomy; L, Lightning; M, Misty; O, Overcast; P, Passing showers; Q, Squally; R, Rain; T, Thunder; U, Ugly appearance.—Adopted at the Greenwich Observatory.

No. II.

Meteorological Register, Colombo in Ceylon, for April, 1847.

[Furnished by Dr. Roe, Deputy Inspector of Hospitals in Ceylon.]

Date.	Thermometer.			Barometer.		Winds.	Atmospheric Observations.	
	Morning	Mid-day	Night	Morning	Evening	Day and Night	Day.	Night.
1	76	90	78	29-90	29-90	N E	Clear and	Dry
2	76	87	83	29-90	29-90	do	Cloudy, dry	Cloudy
3	78	89	80	29-92	29-90	Vble	Clear, dry	do
4	78	87	82	29-92	29-92	East	Cloudy	Thunder, lightning & rain
5	78	85	76	29-92	29-96	—	do	do do in torrents
6	78	86	78	29-95	29-95		do	do do
7	78	84	76	29-95	29-90		do	Rain
8	78	84	78	29-90	29-90		Clear	Showers
9	76	85	77	29-90	29-90	Vble	Cloudy	Rain, thunder & lightning
10	76	85	78	29-90	29-90		do	much do do do
11	75	82	75	29-85	29-85		do	do
12	74	82	78	29-80	29-80	High wind Vble	Showers	
13	76	82	78	29-80	29-85	—	Cloudy	
14	76	89	78	29-90	29-75	Windy	Showers	Showers
15	76	84	80	29-78	29-75	do	do	do
16	76	85	86	29-80	29-76	V W	do	do
17	76	86	78	29-80	29-86	do	do	do
18	76	84	78	29-86	29-86	do	do	do
19	76	87	82	29-90	29-80	Mild	Dry	Clear
20	76	85	82	29-90	29-90		Much rain	
21	78	84	80	29-95	29-95	—	Cloudy	Showers
22	78	84	82	29-03	29-90		do	do
23	80	86	82	29-89	29-90	S W	Clear, dry	
24	80	89	83	29-92	29-90	Windy	Cloudy	Clear
25	80	87	82	29-90	29-90	S W	Windy, Clear	Dry
26	80	88	82	29-90	29-90	do	do do	
27	82	89	82	29-92	29-92	do	do Cloudy	Dry
28	82	89	82	29-90	29-90	do	do Clear	
29	83	90	82	29-90	29-90	do	do do	
30	82	90	83	29-90	29-90	do	do do	

No. III.

Meteorological Observations, made at the Observatory on Dodabetta (8,640 feet above the level of the sea.)

[The following document was sent by Dr. ST. JOHN, Deputy Inspector of H. M.'s Hospitals at Madras.]

DATE. 1847.		BAROMETER.	THERMOMETER.				WIND.		WEATHER.
			Dry.	Wet.	Max.	Min.	Force.	Direction.	
April.		Inches.	°	°	°	°	lbs.		
D	H								
15	0						7 0	E by N	
	1						7·0	E	
	2						6·0	E	
	3						5.0	E ½ N	
	4						4·0	E N E	
	5						3·0	E N E	
	6						4·0	E N E	
	7						2·5	E by N	
	8						2·0	E by N	
	9						1·5	E	
	10						1·5	E	
	11						2·5	E	
	12						4 0	E	
	13						5·0	E	
	14						7·0	E	
	15						10·0	E	
	16						8·0	E	
	17						7·0	E	
	18						8·0	E	
	19						8·0	E	
	20						9·0	½ S	
	21						10·0	E ¼ S	
	22	21·998	51.8	51·3	—	47·0	6·0	E ¼ S	o. m.
	23						3·0	E by S	
16	0						3·0	E S E	
	1						4·0	E S E	
	2						3·0	E by E	
	3						4·0	E	
	4	21·912	51·5	51·0	50·0	—	5·0	E ½ N	
	5						7·0	E ½ N	
	6						9·0	E ¼ S	
	7						8·0	E by S	
	8						7.0	E by S	
	9						12·0	E	
	10						12·0	E ¼ S	
	11						12·0	E ¼ S	
	12						10·0	E by S	
	13						8·0	E by S	
	14						12·0	E S E	
	15						12·0	E S E	
	16						10 0	E S E	
	17						12·0	E by S	
	18						12 0	E S E	
	19						13·0	E S E	
	20						15·0	E S E	
	21						13·0	E S E	
	22	21·946	54·0	52·5	—	48·5	15·0	E S E	o. r. r.
	23						18 0	E by S	
17	0						22 0	S E by E	
	1						22·0	S E by E	
	2						23·0	S E by E	
	3						27·0	S E by E	
	4	21·888	53·0	53·0	53·0	—	28·0	S E	o. r. r.
	5						20 0	S E ¼ E	
	6						30 0	S E ½ E	

Dodabetta Observations Continued.

Date. 1847.		Barometer.	Thermometer.				Wind.		Weather.
			Dry.	Wet.	Max.	Min.	Force.	Direction.	
April.	H	Inches.	°	°	°	°	lbs.		
D	7						30·0	S E ½ E	
	8						30·0	S E ½ E	
	9						25·0	S E ½ E	
	10						20 0	S E	
	11						20·0	S E	
	12						20·0	S E ½ E	
	13						20·0	S E by S	
	14						20·0	S by E	
	15						20 0	S W by S	
	16						20·0	S W by W	
	17						20.0	S W by W	
	18						20·0	S W by W	
	19						18·0	N E by N	
	20						15·0	S S E	
	21						12·0	S E by S	
	22	22·016	53·0	52·7	—	51·5	10 0	S by E	o. r.
	23						12·0	S E by S	
18	0						8 0	S E ½ S	
	1						12·0	S E by S	
	2						12·0	S E by S	
	3						17·0	S by E	
	4	21·952	53·5	53·0	53·5	—	13·0	S	o. m.
	5						15·0	S by E	
	6						18 0	S by W	
	7						17·0	S by W	
	8						15·0	S by W	
	9						17·0	S S W	
	10						16·0	S S W	
	11						16·0	S S W	
	12						16.0	S S W	
	13						13 0	S S W	
	14						13·0	S S W	
	15						12·0	S S W	
	16						15·0	S S W	
	17						15·0	S S W	
	18						18·0	S by W	
	19						20 0	S S W	
	20						15·0	S by W	
	21						10·0	S S W	
	22	22·056	53·0	53·0	—	49·5	10·0	S W ½ S	c. v.
	23						4 0	W S W	
19	0						7·0	W by S	
	1						4·0	W by S	
	2						3·5	W by S	
	3						2·5	W	
	4						2·0	W	
	5						3·0	W S W	
	6						3·0	W by S	
	7						7·0	N N W	
	8						7·0	E by N	
	9						8·0	E N E	
	10						5·0	E N E	
	11						6·0	E N E	
	12						5·0	E N E	
	13						7·5	E by N	
	14						7·5	E by N	
	15						6·0	E by N	
	16						6·0	E by N	
	17						3·0	E by N	
	18						4·0	E ½ E	

Dodabetta Observations Continued.

Date. 1847.		Barometer.	Thermometer.				Wind.		Weather.
			Dry.	Wet.	Max.	Min.	Force.	Direction.	
April.		Inches.	°	°	°	°	lbs.		
D	H								
	19						2·0	E	
	20						2·0	E by S	
	21						0·5	E by S	
	22	22·138	53·0	52·5	—	47·4	0·5	E by S	
	23						0·5	S W by W	
20	0						0·3	W by S	
	1						0·3	W by N	
	2						0·3	W	
	3						0·3	W S W	
	4	22·056	54·0	54·0	57·8		0·2	S W	
	5						0·4	S W by W	
	6						0·0	S W by W	
	7						0·0	W	
	8						0·2	W S W	
	9						0·6	W S W	
	10						0·3	W by S	
	11						0·1	W S W	
	12						0·0	W by S	
	13						0·1	W by S	
	14						0·1	W	
	15						0·3	W by S	
	16						0·3	W	
	17						1·2	W	
	18						1·6	W	
	19						0·8	W	
	20						0·6	W ½ N	
	21						0·2	W by N	
	22	22·126	52·0	51·0		48·0	0·2	W	b. v.
	23	·124	55 0	52·0			0·1	W	—
21	0	·116	55·0	52 0			0·3	W N W	—
	1	·100	57·0	52·5			0·2	W N W	—
	2	·092	57·5	52·0			0·3	N W	—
	3	·080	57·0	52·0			0·4	W by N	—
	4	22 078	57·0	52·5	61·5		0·2	W by N	—
	5	·084	55·0	50·5			0·4	W by N	—
	6	·084	53·0	5·.·0			0·3	W by N	—
	7	·086	52 0	48·0			0·6	W by N	—
	8	·094	51·5	51·5			0·6	W N W	—
	9	·118	51·0	45·5			0·7	W by N	—
	10	·118	51·0	44·8			0·7	W N W	—
	11	·110	50·0	44·0			1·0	W N W	—
	12	·081	50·0	44·0			1·0	W N W	b.
	13	·070	50·0	44·0			1·0	W by N	—
	14	·054	50·0	44·0			0·8	W by N	—
	15	·050	50 0	41 0			0·4	W by N	—
	16	·048	50·0	43·5			0·3	W by N	—
	17	·050	49 5	42·5			1·7	W by N	—
	18	·064	50·0	42·0			2·0	W by N	b. v.
	19	·084	51 0	41·5			1·4	W by N	—
	20	·096	51·0	43·0			1·5	W by N	—
	21	·119	51·5	45·5			0·2	W by N	—
	22	22·128	53·0	46·0		49·5	0·7	W	—
	23						0·7	W by N	
22	0						1·0	W by N	
	1						0·4	W N W	
	2						0·0	W N W	
	3						0·0	W N W	
	4	22·072	55·0	52·0	62·0		—	N N W	b. v.
	5						—	—	
	6						—	N W by N	
	7						—	N W by N	
	8						—	N W by N	

Dodabetta Observations Continued.

Date. 1847.		Barometer	Thermometer.				Wind.		Weather.
			Dry.	Wet.	Max.	Min.	Force.	Direction.	
April.	H	Inches.	°	°	°	°	lbs.		
D									
	9						0·0	N W by N	
	10						—	—	
	11						—	—	
	12						—	—	
	13						—	—	
	14						—	—	
	15						—	—	
	16						—	—	
	17						—	—	
	18						0·1	W N W	
	19						0·2	—	
	20						0·0	—	
	21						—	W by N	
	22	22·128	54·0	49·0	—	49·5	—	W	b. v.
	23						—	N W	
23	0						—	N N W	
	1						1·0	N N W	
	2						0·2	N N W	
	3						0·3	N by W	
	4	22·060	58·0	54·8	61·9		0·3	N by W	c. h.
	5						0·3	N by W	
	6						0·6	N by W	
	7						0 4	—	
	8						0·0	—	
	9						—	—	
	10						—	—	
	11						—	—	
	12						—	—	
	13						—	—	
	14						—	—	
	15						—	—	
	16						—	—	
	17						—	—	
	18						—	—	
	19						—	—	
	20						—	—	
	21						—	—	
	22	22·128	55·5	54·0		49·5	—	—	c. v.
	23						—	—	

N. B.—The Barometer and Thermometers at the Observatory on Dodabetta are registered at 10 A. M. and 4 P. M. daily, with the exception of the 21st of each month, when hourly observations are made. In the column weather, b represents blue sky, *b* represents that one half of the sky is cloudless, and n perfectly clear sky; c, represents cloudy; o, overcast; r, rain; r r, continued heavy rain; f, fog; m, mist or drizzling rain; v, shews that the air is clear, inasmuch as distant objects are very visible; and *v*, that a more than ordinary clearness prevails.

Rain measured at 10 A. M. on April		Inches.
	15th	0.01
	16th	1·14
	17th	4·75
	18th	10·00
	19th	1·72
	20th	0·09
	21st	0·00
	22nd	0·00
	23rd	0.00
	24th	0·00

The mark — in the columns devoted to the wind, represents that the air was too light to act on the vane or pressure plate.

(Signed) T. G TAYLOR,
H. C. Astronomer.

No. IV.

Meteorological Observations at Tellicherry, in April, 1847.

[Furnished by Surgeon MacGregor, H. M.'s 25th Regiment.]

Date.	Winds, from 15th to 22nd April last.	Weather, from 15th to 22nd April last.
April 15th,	Fresh Southerly winds during the day.	Cloudy hazy unsettled weather.
	At sun set the winds came at the S.E. and hauled round the East N.E. and N.	With threatening appearance all round.
	Fresh breeze, variable at South, and towards morning light, dies off the land.	Cloudy, with thunder, lightning, and drizzling rain.
16th,	Light variable breezes at S. to S.E. and E. during the day.	With thick hazy weather, and drizzling rain.
	Fresh breezes, variable at S.E. to E. during the night.	Cloudy, with thunder, lightning, and and slight rain.
17th,	Throughout the day strong breezes variable at S. to S.E.	With thick cloudy weather and slight rain.
	Hard squalls at the Southward during the night.	Cloudy, with thunder, lightning, and heavy rain at times.
18th,	Light breezes at the Southward, during the day.	Cloudy, with rain at intervals.
	Squally variable at S. to S.E. during the night.	Cloudy, with thunder, lightning, and heavy rain at times.
19th,	First part of the day squally at the Southward.	With heavy rain, dark cloudy unsettled weather, and distant thunder.
	Latter part of the day moderate breezes at the Westward.	With fine weather.
	Fresh breezes at the Southward during the night.	Cloudy, with slight rain, thunder, and lightning at intervals.
20th,	Moderate breezes, variable at S. to W., during the day.	Chiefly fine weather. Towards sun set squally appearance over the land, with distant thunder.
	Fresh breezes at the Southward during the night.	Cloudy, with thunder, lightning, and slight rain at times.
21st,	Moderate breezes variable at the S. to S.W. and West during the day.	Fine weather.
	Light breezes at Southward during the night.	Cloudy, with thunder, lightning, and slight drizzling rain at times.
22nd,	Moderate breezes, variable at S. to S.W. and West, during the day.	Fine weather.

N. B.—From the 15th up to the 23rd April last, a heavy surf rolling in upon the beach.

No. V.

Meteorological Observations made at the Garrison Hospital at Cannanore, in April, 1847.

Month and Date.	Thermometer.			Barometer.			Rain.		Wind.		Morning.	Forenoon.	Afternoon.	Evening.	Night.
April 16th	85	86	85	29·712	29·650	29·660	...	1	N E	N E	Much overcast and still.	Much overcast wind S E	Densely overcast and drizzling. wind NE	Overcast & drizzling rain	Drizzling throughout
17th	81	79	79	29·640	29·616	29·656	...	13	S E	S E	Much overcast and rainy.	Much overcast squall and rainy WSE	Densely overcast and drizzling wind SE	Rainy with thunder and lightning	Rainy and squally
18th	79	79	79	29·720	29·712	29·742	6	3	S E	S E	Drizzling with occasional showers.	Frequent heavy showers with occasional thunder	A very heavy shower at 1 o'clock with occasional thunder, attended lightning SE	Frequent heavy showers attended with very loud peals of thunder	Rainy
19th	79	83	81	29·786	29·788	29·820	5	8	S W	S W	Very cloudy and close with some drizzling.	Clearing up cumulus, wind S	Cloudy with short intervals of sunshine, SW	Fair and cumulus	Clear
20th	80	83	81	29·868	29·846	29·862	...	...	S W	S E	Fair and cloudy cumulus,	Cloudy with intervals of sunshine, wind SW	Very cloudy. A slight shower at 3 P M with some thunder. Wind W	Fair and cumulus	Cloudy with sheet lightning and a strong shower between 8 and 9
21st	79	84	83	29·878	29·866	29·884	...	3	E	N E	Fair and cloudy cumulus.	Sunny and a slight shower of rain at 8 A M & horizon cirro-cumulus winds S	Sunny and cumulus, wind W	Fair and cumulus	Clear
22nd	80	86	84	29·846	29·866	29·872	...	...	N E	N W	Fair and cirrus horizon cumulus.	Clear cumulus SW	Clear cumulus Wind W	Clear horizon strato cumulus	Clear
23rd	80	87	85	29·850	29·824	29·828	...	...	N E	N W	Clear horizon cumulus.	Clear sun powerful cumulus towards NE wind W	Clear and breezy —wind NW	Clear and breezy; horizon cumulus	Clear
24th	82	88	86	29·864	29·828	29·860	...	...	N E	N W	Cirro-cumulus and still.	Clear E and N E cumulus, breezy Wind NW	Clear and windy —wind NW	Clear and breezy —horizon rather overcast	Clear and breezy

No. VI.

Meteorological Observations made at the Magnetical Observatory, Bombay—April, 1847.

(Furnished by Captain MONTRIOU, I. N.)

Date and Observatory Mean Time.	Barometer Corrected to 32d Fht.	Air Thermometer.	Wet Bulb.	Pressure of Moisture.	Wind. Direction.	Wind. Force.	Extent of Cloudy Sky	State of the Weather.
April 1847. H		°	°			lbs.		
14th Noon.	29·781	85·8	79·2	0·903	N W	1·30	1/4	Cirri and light fleecy Clouds, extending from the N horizon to the S W horizon (by East)
„ 2	29·727	85·8	79·0	0·895	N W by N	2·08	1/8	Cirri, scattered, in the E, S E, and S
„ 4	29·706	83·8	78 2	0·884	N N W	2·08		Light Cumulus in the East, and Cirrostratus in the S W
„ 6	29·726	81·0	77 4	0·882	„ „ „	2·08		Mist in the horizon
„ 8	29·761	80·5	76·5	0 852	„ „ „	0·78		Clear; lightning in the East at 8h 30m
„ 10	29·784	80·1	76·5	0·856	„ „ „	0 52		Clear
„ 12	29·776	79·0	75·0	0 8·0	„ „ „	0·05		Nimbi in the East and South horizon
„ 14	29·732	77·8	75·0	0 823	„ „ „	0·05		Stratus in the East horizon
„ 16	29·721	77·6	75·2	0·836	„ „ „	0·00		Black Clouds like Cirrostratus in the East
„ 18	29·746	75·1	74 0	0 815	N by W	0·00	1/4	Cirrostratus from S E to N W horizon; Mist all round
„ 20	29·777	81·5	76·2	0·829	N by E	0·78	1/4	Cirrocumuli in the S E, S and S W horizon; do
„ 22	29·763	85·5	78·5	0·878	N by W	0·52	1/4	Light fleecy Clouds, and Cirri, scattered all round the horizon: Cirrocumuli in the South
15th Noon.	29·716	85·3	80 0	0·943	N W by N	0·99		Mist in the horizon
„ 2	29·664	84 7	79·4	0·924	„	1·50		A few Cumuli in the E; and Cirrostratus in the W
„ 4	29·623	84·0	79 0	0·915	„	2·08		Light Cirrostratus, and Cirrus scattered throughout
„ 6	29·645	81·7	78·7	0·928	N W	1·30		Cirrus, Cirrostratus and Cirrocumulus scattered throughout: Mist in the horizon
„ 8	29·676	80·2	78 0	0·915	N N W	0·52		Nimbus in the North, N E and S E
„ 10	29·691	80·0	78·0	0 917	„	0·00		Nimbi scattered, but Zenith clear: lightning in the E horizon
„ 12	29·694	79·0	78·0	0·928	N W by W	0·05		Nimbi scattered throughout. At 12h 30m wind changed from N W by N (round by S) to S W by W
„ 14	29·672	78·8	77 2	0·897	S W by W	0·52		„ „ „ „ At 14h 30m wind returned to W S W (round by S)
„ 16	29·644	78·6	76 4	0·870	W N W	0·26		Cirrostratus, and Cirri scattered throughout
„ 18	29·674	76·5	76·0	0·876	N by W	0·05		Cirrus, Cirrostratus, and Cirrocumulus, scattered throughout: Mist in the horizon
„ 20	29·716	84 0	79 2	0·923	N E	0·05	W	Cirrus, and Cirrostratus throughout: Mist in the horizon
„ 22	29·729	86·6	80·0	0 928	N W	0·05	W	Cirrus, and Cirrostratus, moving N Eastward: thick black Mist extending from N horizon to S (by W). From 20h 0m to 22h 0m wind changed regularly from N E (round by S) to N W by W, and at 21h 20m it returned to S

Bombay Meteorological Observations continued—April, 1847.

Date and Observatory Mean Time.	Barometer Corrected to 32d Fhr.	Air Thermometer.	Wet Bulb.	Pressure or Moisture.	Wind. Direction.	Wind. Force.	Extent of Cloudy Sky.	State of the Weather.
April 1847. H		°	°			lbs.		
16th Noon.	29·697	87·6	81·0	0·960	N W	0·05	W	Cirri and Cirrostratus throughout: black mist extending from N to S horizon (by W)
„ 2	29·646	87·8	81·0	0·968	N W by W	0·10	½	... ...
„ 4	29·597	84·8	80·2	0·956	N W	0·78	¼	... ...
„ 6	29·630	82·1	79·5	0·957	„	0·52	W	... ...
„ 8	29·658	80·6	79·0	0·952	S W by S	0·36	½	Nimbus like clouds in the horizon: lightning, in continued flashes, in the SE horizon. At 7h 20m wind changed from NW to SW (round by S)
„ 10	29·693	81·3	79·0	0·945	S	0·47	½	Nimbi scattered throughout, lightning in the SE horizon
„ 12	29·682	82·2	79·4	0·951	S by W	0·26	½	... ... From 12h 35m to 13h 05m wind changed regular from S by W to N W
„ 14	29 631	81·1	79·3	0·959	N W	2·08	½	... ... A light squall of wind which lasted for some minutes
„ 16	29·630	80·3	78·0	0·914	„	0·52	½	Nimbi: zenith partly clear
„ 18	29·657	78·5	76·5	0·874	N by E	0·05	½	Nimbus from N to S (by E); Cirrus and cirrocumulus throughout: mist all round the horizon
„ 20	29·698	86·9	70 4	0·900	N E by E	0·36	¼	Cirrocumulus throughout, mist in the horizon
„ 22	29·709	94·2	79·7	0·832	E N E	0·05	W	Cirri and corrostratus above, and light fleecy clouds below, fleecy clouds and black mist in the horizon, the latter extending from N to S (by W). At 22h 20m wind changed from ENE to WNW (round by N)
17th Noon.	29·661	91·2	82.0	0·965	N W	0·52	W	Cirro and cirrostratus moving gently SE ward: light fleecy clouds throughout
„ 2	29·599	87·2	80·5	0·943	N W by N	2·60	W	Dense masses of Nimbi, and Cumulostratus in the E: dense fleecy clouds and cirri scattered in the remaining parts of the sky

17th April. No Observations are made from 4 P. M. on Saturdays, till 4 P. M. on Sundays; but as the appearance of the atmosphere indicated an approaching change, although the instruments (Magnetic and Meteorological) remained steady, partial observations were made until midnight, when the atmosphere began to clear, and the wind moderated. The direction of the wind was nearly N W from noon to 6 P. M, when it suddenly changed (by the S) to SE, and its force increased from 1·78 to 3·0 lbs. At 7 P. M, the whole of the Sky became overcast, and the wind due S; at 8 P. M. large drops of rain fell, and the wind changed to SE; at 9 P. M. to the N of the Zenith began to clear, and the wind changed to S by W (round by S) and blew a little fresh. It remained nearly in this direction until 18h 40m, when it changed (by W) to NNW; at 19h 0m it was due N; at 20h 40m it changed to NE, and at 20h 40m it came back (by N) to NW, where it remained until 29 minutes past noon of the 18th, when it suddenly changed to E (round by S) and backed in about 5 minutes to SE, in which direction it remained till sun-set, blowing in strong gusts, from 2·25 to 3·50 lbs.

Bombay Meteorological Observations continued—April, 1847.

Date and Observatory Mean Time.	Barometer Corrected to 32d Fhr.	Air Thermometer.	Wet Bulb.	Pressure of Moisture.	Wind.		Extent of Cloudy Sky.	State of the Weather.
					Direction.	Force.		
April 1847. H		°	°			lbs.		
18th Noon.								
" 2								
" 4	29·628	91·3	76·0	0·714	S E	2·08	W	Cirrocumulus, and fleecy Clouds throughout: Wind squally
" 6	29·666	86·5	73·5	0·670	S E by E	1·56	W	Cirrus, cirrostratus and fleecy clouds throughout
" 8	29·670	84·4	72·4	0·653	E	0·05	W	Cirrostratus and fleecy clouds: zenith partly clear
" 10	29·703	84·5	72·5	0·661	E by S	0·99	W	Nimbi scattered throughout
" 12	29·663	83·0	73·0	0·690	E	1·30	W	Nimbi scattered: light clouds in the zenith, through which some stratus are dimly seen
" 14	29·632	81·7	73·0	0·705	"	1·56	W	
" 16	29·635	80·4	73·0	0 720	"	0·42	W	Nimbi throughout: a few drops of rain
" 18	29 669	79 8	71·8	0·682	N E by N	0·52	W	Nimbi throughout
" 20	29·702	81·8	72·6	0·689	N E	0·05	W	Nimbi throughout, and cumulus and stratus in the horizon: raining very lightly
" 22	29·705	85·5	74·2	0·709	"	0·47	W	... ... Raining lightly
								... ...
19th Noon.	29·671	91·6	76·0	0·710	N E	0·47	W	
" 2	29·639	85·2	74 0	0·704	E	1·56	W	Nimbus extending from NE to S horizon (by E): dense fleecy clouds throughout
" 4	29 590	82·8	72·3	0·667	N E	2·08	W	Overcast with Nimbi, raining
" 6	29·620	78 0	73·0	0·746	N E	0 78	W	... ... At 4h 30m the force of the wind increased to between 4 & 5lbs
" 8	29·634	79·7	74 0	0·764	E	1·30	W	... ...
" 10	29·656	78·5	74·5	0·797	E by N	0·99	W	... ...
" 12	29·655	76·0	73·0	0·768	N	0·78	W	... ...
" 14	29 628	75·8	74·0	0·807	N N E	1·04	W	... ...
" 16	29·633	75·7	74·0	0·808	"	0·05	W	... ...
" 18	29·672	78·0	75·0	0·821	N E by N	0·42	W	Nimbi moving Westward: cumulus and stratus in the horizon
" 20	29·725	78·9	76·0	0 850	N E	0·10	W	... ... raining. (Total fall of rain, 0·31 inches.)
" 22	29·708	79·2	75·6	0·831	N E by E	0·26	W	Nimbi: raining

Bombay Meteorological Observations continued—April, 1847.

Date and Observatory Mean Time.	Barometer Corrected to 32d Fhr.	Air Thermometer.	Wet Bulb.	Pressure of Moisture.	Wind. Direction.	Wind. Force.	Extent of Cloudy Sky.	State of the Weather.
April 1847. H		°	°			lbs.		
20th Noon.	29 676	82·3	77·0	0·852	N N E	0·36	W	Nimbi and dense fleecy clouds
" 2	29·649	86·9	78·0	0·841	"	0·21	W	... ... A shower of rain at 3h 52m
" 4	29·627	84·9	78 0	0·863	N N E	0·05	W	... ... At 4h 50m wind changed (by N) to N W
" 6	29·656	82·0	79 0	0·937	N W by W	0·42	W	
" 8	29·694	81·4	79·0	0·944	W N W	1·04	W	... ... part of a rain-bow visible in the SE
" 10	29·704	80·5	78·5	0·933	"	0 36	⅞	Nimbi: masses of dense fleecy clouds moving SEward: zenith partly clear.
" 12	29·693	79 5	78·5	0·944	"	0·26	⅞	[shining brilliantly Nimbi scattered in the horison: lightning, in continued flashes, in the S bor[illegible]: stars
" 14	29·662	80·0	77·0	0·877	N W by N	1·04	¼	Black clouds, like cirrostratus, scattered along the horison: lightning in the S
" 16	29·668	78·7	77·0	0·891	N N W	0·00	⅛	... ...
" 18	29·722	78·6	77·4	0·908	"	0 00	⅛	
" 20	29·754	82·2	79·0	0.935	N W by W	0·05	W	Nimbi and fleecy clouds, below; cirri and cirrostratus, above, moving southward
" 22	29·756	85·0	79·4	0·920	W N W	0·42	W	Nimbi and fleecy clouds, the latter below and moving S Eastward Nimbus extending from the N (by E) to S, dense fleecy clouds moving to the W: black mist extending along the horison from NW (by W) to SW
21st Noon.	29·763	87·6	80·0	0·916	W by S	0·52	W	Cumuli in the horison from N to S (by E); and cirri throughout: electrical cumuli in the S: a solar halo
" 2	29·706	88·2	79·5	0·889	W	1·04	W	Cumuli in N, E and S horizon; Nimbi in the S: and cirri and cirrostratus throughout
" 4	29 697	84·7	78·0	0 836	W	1 30	W	Nimbi scattered throughout, and Cumuli in the NE and N
" 6	29·736	82 7	77·7	0·875	"	0·36	W	Nimbi, and dense fleecy clouds throughout
" 8	29·762	81·9	77·4	0·872	"	0·52	W	... ...
" 10	29·783	81·0	77·4	0·882	W by S	0·16	⅛	Nimbi in the horizon from N to S, (by E); and Cirri and Cirrostratus throughout: a lunar halo
" 12	29·765	80 5	76·8	0·863	"	0·36	W	Nimbi scattered around the horison
" 14	29·729	80·0	76·2	0·846	"	0·52	¼	Black Clouds, like Nimbus, scattered in the E, NE, and SE
" 16	29·728	79 7	76·2	0·845	"	0·26	⅛	Detached masses of Nimbi moving from E to W
" 18	29·779	79·8	77·2	0·887	"	0·05	0	Cirrocumuli; and Cumuli and Mist in the horison: fleecy clouds between them moving N Eastward
" 20	29·831	84·8	78·8	0·898	"	0·21	⅞	Cumuli and Mist in the horison; fleecy clouds moving NE; and Cirrocumuli: Zenith clear
" 22	29·846	86·5	79·7	0·917	W S W	0·10	W	Cumuli in the horison: Nimbus in the E, S, and NE: Nimbi moving in a central direction to the wind
" 24	29·825	88·0	80·5	0·934	W by S	0·26	W	Dense fleecy clouds, like Nimbus, throughout

No. VII.

Note on the state of the Weather at Sedasghur.

[Furnished by Surgeon MacGregor, H. M.'s 25th Regiment.]

Weather very cloudy and threatening for several days, before the 16th April, when the wind blew very strong from the East, about 9 o'clock P. M., and by 12 o'clock it had increased to a gale, which continued till about 12 o'clock A. M. of the 17th, by which time the wind had got round gradually to the monsoon quarter, S.W. During the night, the Thermometer fell at least 8 degrees in my house, which is in an exposed situation on the top of a hill. Thermometer at 8 in the evening of 16th stood at 84°; by the morning it was 76°. After 12 o'clock on the 17th the wind moderated a good deal, though it blew pretty hard the remainder of that day, and the 18th, with rain. Two or three pattemars were wrecked even in the back water, which is a good deal sheltered to the southward. The tide must have risen three or four feet higher than the highest spring tides, and overflowed the paddy-fields in different directions, within about 100 yards of the barracks.

Signed) G. SINGLETON, Captain,
Commanding Sedasghur.

Sedasghur, *3rd June*, 1847.

No. VIII.

Meteorological Observations made at the Madras Observatory.

[The following was furnished by Dr. St. John, Deputy Inspector of H. M.'s Hospitals at Madras.]

Date 1847.			Barometer.	Thermometer.		Wind.		Remarks.
				Dry.	Wet.	Force.	Direction.	
April.			Inches.	°	°	lbs.		
D	H	M						
15	0	41	29·972	91·0	79·9	0·5	S	Cum Cir & Cir haze.
	1		·939	91·0	80·0	0·5	S S E	... ...
	2		·922	90·3	79·9	0·2	S	Cum Cir haze & Cir strat.
	3		·918	89·9	79·9	0·3	S by E	... ...
	4		·924	88·4	79·2	0·1	S by W	Cum Cir & Cir haze.
	5		·931	87·1	79·1	0·1	S	... ...
	6		·948	86·0	79·0	0·1	S by W	... ...
	7		·959	85·2	78·8	...	S S W	... ...
	8		·976	84·8	79·0	...	S by W	... ...
	9		30·000	84·6	79 0	...	S by W	... ...
	10		30·010	84 5	79 0	...	S by W	... ...
	11		29·994	84·4	79·0	...	S S W	... ...
	12		·981	84·1	79·0	...	S by W	Cir haze, & Cir Cum.
	13		·964	83·9	78·8	0·1	S by W	Overcast, sheet ltg S W.
	14		·940	83·7	78·7	...	S by W	.. ..
	15		·930	83·5	78.5	...	S by W	Nearly overcast.
	16		·932	83·4	78·8	Calm	S S W	Cir Cir haze and Cir str.
	17		·944	83·2	78 8	Calm	S W by S	Nearly overcast Nimbi.
	18		·968	81·9	78·1	Calm	W S W	Nimbi, rain, thunder.
	19		·998	82·4	78·3	Calm	S W	Nearly overcast Nimbi.
	20		30·004	84·0	79·0	0·1	S W	... ...
	21		29·990	85·3	78·3	0·8	S S W	... ...
	22		·994	86 1	78·1	0·4	S by W	Nearly covered cum & cir.
	23		·979	86·7	78·1	1·1	S by W	Nearly overcast cir cum

Meteorological Observations made at the Madras Observatory continued.

Date 1847.			Barometer	Thermometer.		Wind.		Remarks.
				Dry.	Wet.	Force.	Direction.	
D	H	M	Inches.	°	°	lbs.		
16	0	41	29·946	85·2	78·2	0·4	S	..
	1		·918	85 2	78·3	0·2	S	..
	2		·912	85 1	78·1	0·3	S	...
	3		·900	84·4	78·1	0·2	S	...
	4		·904	83·7	77·0	0·2	S by W	...
	5		·911	83·1	76·9	...	S S W	...
	6		·522	82·7	77·0	...	S S W	Overcast
	7		·940	82 6	77·1	Calm	S W by S	Cum Cir cir haze lightg E
	8		·919	82·6	77 3	...	S W by S	Cum in horizon
	9		·970	82·0	77 0	...	S W by S	Cum and cir haze
	10		·976	81·8	77·0	...	S W by S	.. ..
	11		·950	81 6	77 0	Calm	S W by S	Cir cir haze & cir str.
	12		·931	81·5	77·2	Calm	S W by S	Overcast
	13		·912	80·5	77·3	Calm	S W by S	... str ltg SW.
	14		·882	80·4	77 0	Calm	S W by S	... light rain.
	15		·886	80·5	77·7	Calm	S S W	...
	16		·912	80·5	77·7	Calm	S S W	...
	17		·922	80·4	77·8	Calm	S S W	... light rain.
	18		·952	80·7	77·8	Calm	S S W	... ...
	19		·986	81·6	78·2	Calm	S W	... ...
	20		30·004	81·3	77·3	Calm	S S W	... ...
	21		·022	82·0	77·4	...	S by W	... ...
	22		·014	84·1	77·9	...	S by E	Cum cum str, cir str.
	23		29·998	81·3	77·9	...	S by E	... ...
17	0		29·970	85·4	78·1	...	S	Cum cir str and cum str.
	1		·932	84·7	78·1	...	S S W	... ...
	2		·910	85·0	78·4	0·1	S S W	... ...
	3		·906	85·0	78·5	...	S by W	... ...
	4		·926	83·9	78·5	...	S by W	Overcast. Nimbi SW.
	5		·939	83·1	79·0	Calm	S by W	... very light rain.
	6		·954	82·4	78·8	Calm	S W by S	... ...
	7		·964	82·0	78·2	Calm	S W	... ...
	8		·992	81·3	77·0	Calm	S W by W	.. ..
	9		30·012	81·3	77·0	Calm	S W by W	..
	10		·020	80·7	76·7	Calm	W S W	..
	11		·008	80·4	76 4	Calm	W S W	.. light rain.
	12					Calm	W S W	
	13					Calm	W S W	
	14					Calm	W S W	
	15					Calm	W S W	
	16					Calm	W S W	
	17					Calm	S W by W	
	18					Calm	S W	
	19					...	W S W	
	20					...	W S W	
	21					...	S W by S	
	22					0·1	S	
	23					0·7	S by E	
18	0					0·8	S by E	
	1					0 7	S	
	2					0·5	S	
	3					0·3	S by W	
	4					0·3	S by W	
	5					0 3	S by W	
	6					0·1	S S W	
	7					0·1	S S W	
	8					0·2	S W	
	9					0·1	S W	
	10					...	S W by S	
	11					Calm	S W by S	
	12		29·968	81·8	77·4	Calm	S W by S	Cum in horizon.
	13		·956	81 3	77·0	...	S W by S	Cir haze and heavy cum.
	14		944	81·3	77 0	...	S W by S	Heavy Cum and Nimbi.
	15		·934	81·0	77·0	...	S W by S	.. ..

During this day, (*Sunday*) was experienced: light rain.
cirrus, cirrus-haze, and cirrus stratus in the morning and at noon, with cumulus and cirro-cumulus at night.

	Barometer.	Thermometer.
H		
At 10 A. M	30·032	84·0
4 P. M	29·928	87·5
10 P. M	30·000	82·4

Meteorological Observations made at the Madras Observatory continued.

Date 1847.			Barometer.	Thermometer.		Wind.		Remarks.
				Dry.	Wet.	Force.	Direction.	
D	H	M	Inches.	°	°	lbs.		
18	16	41	29·040	80·4	76·0	0·1	S W	.. ..
	17		·952	80·1	76·1	...	S W	Scattered cum & cum str
	18		·980	81·2	77·0	...	S W by W	.. ..
	19		30·004	82·3	78·0	0·6	S W by W	.. cir & cir haze
	20		·028	85·6	78·8	0·8	S W	.. ..
	21		·026	87·6	78·6	0·6	S W	.. haze
	22		·022	89·4	78 6	0·6	S S W	.. and cirri
	23		·011	90·6	80·0	0·9	S	.. ..
19	0		29·981	91·1	80·1	0·9	S	Scattered cum & cirri
	1		·955	90·6	80·0	1·2	S	.. ..
	2		·931	89·7	80·1	1 6	S	.. and light cirri
	3		·913	88·1	79·8	1·6	S	Cum and cirri
	4		·908	87·3	79.8	1·5	S	Cum and Cir-haze
	5		·928	85·6	79·3	1·3	S	.. ..
	6		·950	84·5	79·3	1·0	S	Lt Cir haze over head. Heavy cum & cum str W. horizon. S. Ltg SW horizon.
	7		·954	83·9	79·5	1·0	S by W	Lt Cir Cir-haze W hor, S ltg S W hor
	8		30·000	83·6	79·5	1·1	S W by S	Cum and .. ..
	9		·034	83·6	79·6	1·3	S W	Nearly overcast. S ltg in NW
	10		·028	81·9	79·8	0·4	S W by S	. and very light rain
	11		29 986	80·8	79·5	Calm	S W by S	Cum & cir haze S ltg in NW
	12		·982	80·7	77·3	Calm	S W by S	Overcast, S Lightning W
	13		·980	80·3	76 5	Calm	S W by S	..
	14		·985	80·3	75·8	Calm	S W by S	.. S Lightg N W
	15		·985	80·0	74 3	Calm	S W	..
	16		·978	79·5	73·5	Calm	S W by W	Nearly overcast
	17		·990	79·5	74·0	Calm	S W by W	Cum cir, cir-haze, & cir-str
	18		30·024	80·0	74 7	Calm	S W by W	.. .. ..
	19		·046	82·0	75·3	Calm	W	... .
	20		·072	85·0	77·0	Calm	W N W	Cir Cir haze and Cir strat
	21		·070	88 6	78·5	Calm	W by N	... .
	22		·060	90 5	80·0	0·1	S S W	Cum cir haze & cir strat
	23		·042	90 4	80·0	0·1	S	... .. & cir
20	0		·010	90·1	79·8	0·1	S	Cum cir str & cir haze, cum str S & W
	1		29·980	90·3	79·0	0·2	S	.. ..
	2		·956	90 2	78·5	0·2	S	Cir strat and cir haze
	3		·932	88·5	78·5	0·2	S by E	Cum cir str and cir haze
	4		·930	87·4	79·0	0·2	S by E	Cir strat and cir haze
	5		·939	86·2	79·2	0·3	S	.. ..
	6		·942	85·0	79·0	0·2	S by W	Cir cir str & cum S ltg S W & W
	7		·960	84·5	79·0	0·7	S S W	Cum cir cir str & Cir haze halo round) S ltg S W
	8		·987	84·4	79 5	0·4	S W by S	.. ..
	9		30·000	84·3	80·0	0·6	S W by S	Cir Cir-haze & cum S lightg in S W
	10		·000	84 0	80·0	0·7	S W by S	.. ..
	11		29·996	84 0	80·0	0·4	S W	Lt .. ..
	12		·989	83·8	79·8	0·2	S W	Cum & Cir-haze, S ltg S
	13		·972	83 6	79·3	0·2	S W by W	Cum in horizon
	14		·951	83·0	78·5	0·1	S W	Cum & Cir-haze in horizon
	15		·944	82·4	78·0	...	S W	Clear
	16		·952	82·0	77 6	...	S W	Cir Cir-haze & Cir strat
	17		·974	81·6	77·5	Calm	S W	..
	18		·996	82·1	78·1	Calm	S W	.. .
	19		30·016	84·0	79·0	...	S W by W	.. ..
	20		·034	87·2	78·0	0·1	W by S	Cir & Cir-haze
	21		·034	90·0	76·4	0·3	W by S	..
	22		·022	92·4	76·9	0·4	W by S	.. & Cir-strat
	23		·000	94·3	76·0	0·5	W by S	Nearly clear. Lt cir & cir str

Meteorological Observations made at the Madras Observatory continued.

Date 1847.			Barometer	Thermometer.		Wind.		Remarks.
				Dry.	Wet.	Force	Direction.	
D	H	M	Inches.	°	°	lbs.		
21	0	41	29·970	96·0	77·0	0·1	W by S	Cir, cir-str—Cum in N hozn
	1		·947	95 8	80·2	0 1	S E	Scattered cum & lt cir-strat
	2		·928	91·6	79·8	0·3	S E	... Cir & cir-str
	3		·918	90·6	79·7	0·2	S E by E	Cum cir & cir-str
	4		·916	88·8	80·0	0·4	S E by E	Cir & cir-haze
	5		·922	87·4	80·0	0 3	S E by E	Lt cir cir-str & cir-haze
	6		·942	86·1	79·5	0·1	S E by E	... ...
	7		·966	85 6	80 0	...	S E	Light cir haze
	8		·990	85·3	80 3	...	S S E	... ...
	9		30 010	84·9	79·9	...	S by E	Nearly clear
	10		·004	84·7	79·8	...	S by E	Clear
	11		29·998	84·4	80 0	...	S	..
	12		·961	84·0	79·8	...	S by W	..
	13		·944	84·0	79 6	0·1	S S W	...
	14		·946	83·5	79·3	0·2	S W	...
	15		·942	83 3	79·2	0·1	S W	...
	16		·948	82 8	79·0	...	S W	...
	17		·969	82·5	78·8	...	S W by W	Cir & cir-haze in N horizon
	18		·990	83·9	79·6	...	S W by W	... & Cir-haze
	19		30·004	85·7	77·1	...	W S W	Lt cir-haze & cir-str in hor
	20		·032	87·4	74·4	0 2	W	.. & Cir-str
	21		·031	90·4	75·0	0·1	W N W	Light haze & Cir-str
	22		·026	93·3	76·7	...	N W	... ...
	23		·007	94·7	78·0	...	E by N	Lt Cum & Cir-haze
22	0		29·980	93·8	77 0	0·1	E	Scattered Cum W & N
	1		·952	93·3	76·8	0 2	E by S	Nearly clear. Cum W & N h
	2		·936	93·5	78 9	...	E S E	... ... W horizon
	3		·916	91·7	78·4	0·2	S E	Cum, Cir, Cir-haze
	4		·916	90·5	78·0	0·2	S E by S	Cir & Cir-haze
	5		·924	88·2	78·2	0·1	S E by S	Nearly clear
	6		·936	86·7	78 2	0·1	S S E	Lt cum & haze in horizon
	7		·952	85·8	78·3	...	S E by S	Clear
	8		·963	85·3	78·3	...	S E by S	..
	9		·974	84·7	78 1	Calm	S by E	..
	10		·971	84·6	79 0	Calm	S	..
	11		·958	84·4	79 6	Calm	S S W	..
	12		·930	84·0	79·5	Calm	S W	...
	13		·920	83 3	79·0	Calm	S W	...
	14		·900	83 0	78·5	Calm	S W by S	...
	15		·894	82·5	78 0	Calm	S W by S	...
	16		·912	81·9	77·3	Calm	S W by S	..
	17		·934	81·5	77·4	Calm	S W by S	Cir & Cir-haze
	18		·950	83 5	77·5	Calm	S W by S	Nearly clear.—Cir & cir-haze
	19		·976	85·7	78·7	...	S W	Cir & Cir-haze
	20		·994	88 3	79 3	...	S W	Nearly clear. Light haze
	21		30·006	91·3	78·0	0·1	W	...
	22		·003	94·0	78·1	0·1	N W	Light Cir
	23		29·982	95·4	79·4	0·1	E by N	Scattered cum & Cir-haze
23	0		·957	94·0	79·7	0·1	E S E	Cum in W
	1		·929	93 3	80·0	0·4	S E by E	...
	2		·907	91·7	79 0	0·5	S E	Scattered cum & haze
	3		·891	91 2	79·2	0·6	S E by S	Nearly clear. Lt cir & cir-h.
	4		·898	90 0	78·8	0·4	S S E	... Lt cir-haze.
	5		·900	88 3	78·9	0·4	S S E	... ...
	6		·916	86·6	78·6	0·3	S by E	...
	7		·932	86·0	78·3	0·1	S by E	Clear
	8		·950	85 7	78·7	...	S by E	...
	9		·968	85·5	80·1	0 1	S by E	...
	10		·978	85 2	80·4	0·1	S S W	...
	11		·964	85 0	80·6	...	S by W	Flying clouds & cir-haze
	12		·944	84·7	80·3	...	S S W	Clear
	13		·930	84·0	79·4	...	S W	...
	14		·921	83 5	78·8	...	S W	Lt Cum in horizon
	15		·922	82·8	78·0	0·2	S W	... ...

Meteorological Observations made at the Madras Observatory continued.

Date 1847.			Barometer	Thermometer.		Wind.		Remarks.
				Dry.	Wet.	Force.	Direction.	
D	H	M	Inches.	°	°	lbs.		
23	16	41	29·930	82·0	76·5	0·3	S W	Clear
	17		·952	81·5	76·4	0·2	S W	... light haze
	18		·978	82·0	77·1	...	S W	Lt Cir, & Cir-haze
	19		30·000	86·3	78·2	0·4	S W by W	Cir, Cir-str, & Cir-haze
	20		·016	87·3	77·0	1·1	S W by W	Nearly clear
	21		·028	89·8	76·2	0·7	S W by W	Light Cir-haze
	22		·014	93·8	76 9	0·2	S by E	Quite clear
	23		29·999	95·3	77·8	0·1	S S E	Lt scattered Cum
24	0		·963	95·1	81·8	0·2	S S E	Light scattered Cum
	1		·930	93·2	80·4	0·8	S S E	Cum-from N to W
	2		·897	91·3	80·2	1·2	S E by S	... in W
	3		·882	91·5	79·7	0·9	S E by S	... in W horizon
	4		·888	90·0	79.8	1 1	S E by S	... ...
	5		·900	87·7	80·9	0·8	S S E	... ...
	6		·928	86·6	80·0	1·1	S S E	... & Cir haze
	7		·950	86·0	80·4	1·0	S S E	Covered with cum, forming Nimbi W
	8		·974	85·8	80·5	0 7	S by W	Cum and haze
	9		·988	85·4	80·3	0·8	S by W	Cum, Cir, & Cir-haze
	10		·982	85·0	79·8	0·4	S by W	Cum, cir-cum, cir, & cir-hze
	11		·966	84·8	79·2	0·3	S by W	Nearly covered with cum, cir, & cir-haze
	12					0·3	S S W	
	13					0·4	S W by S	
	14					0·4	S W by S	
	15					0·4	S W by S	
	16					0·2	S W	
	17					0 2	S W	
	18					0·1	S W	
	19					0·4	W S W	
	20					0·1	W S W	
	21					...	W S W	
	22		30·004	93·8		...	W S W	Clear. Lt haze.
	23					...	S E	

N. B.—The date begins to reckon from Noon. The Barometer requires to be corrected for temperature, and the "force" represents the pressure in lbs. on a square foot. The times are for 0h 41m, 1h 41m, and 2h 41m &c., corresponding to the even hours of Gottingen Mean Time.

T. G. TAYLOR,

H. C. Astronomer.

No. IX.

Meteorological Register kept at the Surveyor-General's Office, Calcutta, for the Month of April, 1847.

Latitude 22° 33′ 29″· 33 North. Longitude 88° 23′ 42″· 84 East. Magnetic Variation 2° 28′ 36″ East. Magnetic Dip 27° 45′.

[Sent by Mr. PIDDINGTON, of Calcutta.]

Days of the Month.	Observations Made at Sun rise. Barometer reduced to 32° Fahrenheit.	Temperature. Of the Mercury.	Of the Air.	Of Wet Bulb.	Wind. Direction from Sun set to Sun rise.	Aspect of the Sky.
	Inches.	°	°	°		
1	29· ,,	,,	,,	,,	,,	,,
2	,,	,,	,,	,,	,,	,,
3	29·800	75·0	75·8	73·0	S	Clear,
4 S	·830	80·0	81·0	76·5	S	Cloudy,
5	·887	78 5	79 5	77.0	S	Mists,
6	·925	78·8	79·8	77·0	S	Cloudy,
7	·905	77·0	77·0	76·0	S	Clear,
8	·811	78·5	79·4	77·0	S	Clear,
9	·771	78·5	79·8	77·8	S	Mists,
10	·771	80·0	81·0	78·9	S	Cloudy,
11 S	,,	,,	,,	,,	,,	,,
12	·855	73·0	75·0	73·0	S E	Cloudy,
13	·847	69·4	70 0	69·0	E	Cloudy,
14	·828	75·0	75·2	74·0	S E	Cloudy,
15	·822	70·4	71·0	70·0	N E	Cloudy,
16	·776	73·5	74·5	73·0	E	Cloudy,
17	·743	69·0	69·8	69·0	Calm	Cloudy,
18 S	·768	75·2	76 0	73·2	S E	Cloudy,
19	·709	74·0	74·4	72·0	N E	Cloudy,
20	·695	78·2	79·0	77·8	S	Cirro Cumuli,
21	·687	75·8	77·0	74·0	S	Clear,
22	·700	75 0	75 3	72·2	E	Clear,
23	·637	77·0	78·0	75·0	No observn.	Clear,
24	·664	81.5	82·0	80·0	Ditto	Cloudy,
25 S	·640	82·0	83·0	81 0	S	Cloudy,
26	·642	78·0	78·5	74·0	S	Cloudy,
27	·682	79 8	80·1	74·6	S	Cumulo strati,
28	·732	82 0	83·0	80·0	S	Cirro Cumuli,
29	·687	81 5	82 4	79·8	S	Clear,
30	·728	81·4	82·0	79·0	S	Clear,
Mean.	29·762	77·0	77·7	75·3		

Calcutta Meteorological Register continued.

Days of the Month.	Maximum Pressure Observed at 9h 50m					
	Barometer reduced to 32° Fahrenheit.	Temperature.			Wind.	Aspect of the Sky.
		Of the Mercury.	Of the Air.	Of Wet Bulb.	Direction from Sun rise to 9 h. 50 m.	
	Inches.	°	°	°		
1	29. „	„	„	„	„	„
2	„	„	„	„	„	„
3	29·854	86·7	86·8	78·2	S (high)	Clear,
4 S	·890	88·0	87·5	80·0	S (high)	Cumuli,
5	·946	89·0	88·0	79·2	S W	Cumuli,
6	·975	88·5	87·7	79·4	S	Cumuli,
7	·940	88·5	88·0	80·5	S	Cumuli,
8	·865	89·5	89 0	82·0	S (high)	Clear,
9	·811	89·0	89·0	81·5	S (high)	Clear,
10	·847	89·0	89·0	81·0	S	Cloudy,
11 S	·871	89 0	89·1	82·0	S	Cumuli,
12	·886	88 0	88 5	79·0	S (high)	Cumuli,
13	·840	83·0	81·0	77·2	E	Cloudy,
14	·878	86·0	85·1	78·2	S	Cumuli,
15	·843	83·0	82·0	77·2	E	Cumuli,
16	·789	85·0	84·0	79·5	S	Cloudy,
17	·837	77·5	77·0	71·0	N E	Cumuli,
18 S	·831	86·0	85·0	80·0	S E	Cloudy,
19	·798	87 5	85·5	77 0	S	Cirro-strati,
20	·730	89·8	90·0	81·0	S	Cirro-Cumuli,
21	·722	89·0	89·0	82·0	S	Cumuli,
22	·738	90·0	88·3	80·2	S	Cumuli,
23	·685	88·0	88·0	82·4	„	Cloudy,
24	·708	91·0	90·8	84·0	„	Cumuli,
25 S	·679	92 0	91·0	83·0	S	Cumuli,
26	·716	90·3	89·3	81·0	S	Clear,
27	·743	93·0	92·4	80 5	S	Clear,
28	·761	91·1	91·0	82·1	S W	Cumuli,
29	·747	91·5	91·2	81·8	S	Clear,
30	·773	91·0	91·0	82·8	S	Cumuli,
Mean.	29·811	88·2	87·6	80·1		

Calcutta Meteorological Register continued.

Days of the Month.	Observations Made at Apparent Noon.					
	Barometer reduced to 32° Fahrenheit.	Temperature. Of the Mercury.	Of the Air.	Of Wet Bulb.	Wind. Direction from 9h. 50m. to Noon.	Aspect of the Sky.
	Inches.	°	°	°		
1	30. ,,	,,	,,	,,	,,	,,
2	,,	,,	,,	,,	,,	,,
3	29·862	87·0	86·0	79·2	S (high)	Cloudy,
4 S	·862	89·5	89·0	80·2	S (high)	Cumuli,
5	·925	93·0	92·7	79·0	N E	Cumuli,
6	·945	92·4	92 0	79 5	S	Cumuli,
7	·898	92·7	92·4	82·2	S	Cumuli,
8	·820	94·5	91·8	82·0	S	Clear,
9	·785	91·5	91·0	82·0	S (high)	Cumuli,
10	·817	91·5	91·0	82 0	S	Cloudy,
11 S	·847	93 5	93·0	82·0	S	Cumuli,
12	·832	89·5	89·2	80·8	S (high)	Cumuli,
13	·836	85 5	84·5	79·0	N	Cloudy,
14	·869	87·0	86·5	79·0	S	Cumuli,
15	·786	87·8	87·2	81·0	S E	Cumuli,
16	·750	89·4	89·5	81·0	S	Cumulo-strati,
17	810	77·4	77 0	72·0	E	Cloudy,
18 S	·781	91 0	89·0	80·2	S	Cumuli,
19	·762	89·5	88·2	78·3	S	Cloudy,
20	·692	95·0	95·2	79·0	S W	Cirro-strati,
21	·697	93·1	93 0	84·0	S	Cumuli,
22	·684	93·5	93·0	83·5	S	Cumuli,
23	·656	93·5	93·0	83·0	,,	Cumuli,
24	·672	95·0	94·0	84·0	S	Cumuli,
25 S	·657	95·0	94·5	84·5	S	Cumuli,
26	·697	95·5	95·0	84·0	S W	Clear,
27	·723	97·5	97·3	80 2	W	Cirro-Cumuli,
28	·728	95·0	95·0	80·5	S	Cumuli,
29	·705	96·0	96·0	84·0	S	Clear,
30	·752	95·0	94·0	83·0	S	Clear,
Mean.	29·780	91·3	91·2	81·0		

Calcutta Meteorological Register continued.

Days of the Month.	Observations Made at 2 h. 40 m.					
	Barometer reduced to 32° Fahrenheit.	Temperature.			Wind.	Aspect of the Sky.
		Of the Mercury.	Of the Air.	Of Wet Bulb.	Direction from Noon to 2h. 40m.	
	Inches.	°	°	°		
1	29. ,,	,,	,,	,,	,,	,,
2	,,	,,	,,	,,	S ,,	,,
3	29·802	89·5	90·0	80·0		Cumuli,
4 S	·813	91·0	91 0	80 8	S (high)	Cumuli,
5	·845	96·5	95·1	80·1	N E	Clear,
6	·375	95·5	94·4	79·8	S	Cumuli,
7	·789	96·0	95·0	82·8	S	Cumuli,
8	·731	98 8	98·0	83·0	S W.	Clear,
9	·713	92·7	92·0	82·0	S (high)	Clear,
10	·709	87·8	88 0	79·8	S E	Cloudy,
11 S	·775	93 6	92·5	81·5	S	Cloudy,
12	·828	75 0	74·4	71·0	E	Cloudy,
13	·739	89·0	88·8	81 0	S	Cloudy,
14	·775	90·2	90 0	77·0	S	Cumuli,
15	·677	84 0	94·0	80·0	S E	Rain, Thundering,
16	·653	91·5	90 7	80 2	S	Cumulo-strati,
17	·722	83.0	83 0	75·9	E	Cumuli,
18 S	·701	93·0	92·1	81·0	S	Cumulo-strati,
19	·690	89·8	88·2	78 0	S	Cloudy Haze,
20	·603	97·8	97·0	79·2	W S W	Cumuli,
21	·639	95·0	94·4	83 0	S	Cumuli,
22	·613	94 9	94·0	85·5	S	Cumulo-strati,
23	·585	98·0	97·0	84 5	,,	Cumuli,
24	·604	97·0	96·0	84·2	S	Clear,
25 S	·591	99·0	98 0	85·0	S W	Cumuli,
26	·619	100·5	99·5	80·0	S	Clear,
27	·636	100·1	99·0	81 2	N	Cumuli,
28	·631	98·2	98·5	81·0	W	Cumuli,
29	·641	98·0	97·0	85·8	S	Cumulo-strati,
30	·684	96·9	95·8	84·0	S	Clear,
Mean.	29·703	93·4	92·6	81·0		

Calcutta Meteorological Register continued.

Days of the Month.	Minimum Pressure Observed at 4 P. M.					
	Barometer reduced to 32° Fahrenheit.	Temperature.			Wind.	Aspect of the Sky.
		Of the Mercury.	Of the Air.	Of Wet Bulb.	Direction from 2h 40m. to 4 p. m.	
	Inches.	°	°	°		
1	29. „	„	„	„	„	„
2	„	„	„	„	„	„
3	29·774	89·5	89·0	79·0	S	Cumuli,
4 S	·798	89·0	88 5	80·0	S	Cloudy,
5	·824	96·5	94·5	75·2	N	Clear,
6	·852	91·5	93·0	79·0	S	Cumuli,
7	·772	95·4	94·3	82·0	S	Cumuli,
8	·716	98·5	97·0	84·0	S W	Clear,
9	·693	92·8	92·0	81·0	S	Clear,
10	·724	88·5	88·9	80·0	S (high)	Cloudy,
11 S	·758	87·8	87·0	80 0	S (high)	Cloudy, Thundering,
12	·808	73·0	71·9	69·0	E	Cloudy,
13	·717	87·3	86·5	80·0	N W	Rain, Thundering,
14	·742	89·0	87·8	77·8	S	Cumulo-strati,
15	·682	79·2	77·0	73·0	S E	Cloudy, Thundering,
16	·636	88·0	87·8	79·0	S	Very Cloudy, Thundering,
17	·702	85 0	83·2	75·0	E	Clear,
18 S	·650	92·2	91·5	79·8	S	Cumuli,
19	·667	88·0	87·8	75 5	S	Cloudy and haze,
20	·580	97·0	95·0	82·8	S	Cumuli,
21	·617	95·2	93·0	83·0	S	Cumuli,
22	·581	94·0	92·9	83·0	„	Cumuli,
23	·564	97·0	95·2	83·5	„	Cumuli,
24	·587	97·0	95·1	84 2	S	Clear,
25 S	·566	99·5	98 0	85·0	S	Cumuli,
26	·595	100·5	99·0	80 2	S	Clear,
27	·612	99 8	98·0	77·0	W S W	Cirro-cumuli,
28	·606	99·0	97·8	80·0	S	Cumuli,
29	.616	96 2	95·3	80·9	S	Clear,
30	·670	96·0	94·8	83·0	S	Clear,
Mean.	29·682	92·3	90·1	79·7		

Calcutta Meteorological Register continued.

Days of the Month.	Observations Made at Sun set.					
	Barometer reduced to 32° Fahrenheit.	Temperature. Of the Mercury.	Of the Air.	Of Wet Bulb.	Wind. Direction from 4 p. m. to sun set.	Aspect of the Sky.
	Inches.	°	°	°		
1	29. „	„	„	„	„	„
2	„	„	„	„	„	„
3	29·777	84·0	84·0	78·0	S	Cloudy,
4 S	·833	85·5	85·5	79 0	S	Cloudy, Thundering,
5	·809	90·8	88 5	76·5	N	Clear,
6	·868	87·5	87·0	79·0	S	Cloudy,
7	·770	89·0	88·0	80·0	S	Generally clear,
8	·718	91·8	91·0	84 0	S	Cirro-cumuli,
9	·701	86·5	86·0	81 0	S	To the W. Cloudy,
10	·737	86 0	86·0	79·0	S E	Cloudy,
11 S	·776	81·5	82·0	78 0	S	Cloudy,
12	·810	71·0	71·0	68·7	E	Cloudy,
13	·762	78·0	77·5	72 5	S W	Cloudy, Thundering,
14	·773	84 0	84·0	75·0	S	Cloudy,
15	·720	78·0	77·0	72·0	S E	Cloudy,
16	·686	72 7	72·5	69·4	S E	Cloudy Thundering,
17	·692	82·0	81 0	76·0	N E	Cirro-strati,
18 S	·645	88 0	87·8	80·5	S	Very Cloudy,
19	·686	84·5	84·8	78·0	S	Cloudy,
20	·634	77·0	77·0	71·0	S E	Drizzly,
21	·634	88·0	87·0	81·0	S	Very Cloudy. Thundering,
22	·583	88·8	88·5	82·0	„	To the W. Cloudy,
23	·573	92 0	91·0	84·0	„	Cloudy,
24	·613	89·2	89·0	82 9	S	Cirro-strati,
25 S	·572	92·9	91·0	83·0	S	Generally Clear,
26	·580	95·5	94·0	79·0	S E	Clear,
27	·609	94·9	93·5	78·5	S	Clear,
28	·630	90·0	90·0	73·5	S	Cirro-strati,
29	·628	90·8	90·0	80·0	S	Clear,
30	·672	89·5	88·8	80·0	S	Generally Clear,
Mean.	29·696	86·0	85·5	77 9		

Calcutta Meteorological Register continued.

Days of the Month.	Maximum and Minimum Thermometer.			Maxim. Therm. in Sun's Rays.	Rain Gauges.		Moon's Phases.
					Elevation.		
	Maximum.	Mean.	Minimum injured.	Maximum injured.	Feet. 40 Upper.	Feet. 4 Lower.	
					Inches.	Inches.	
	°	°	°	°			
1	»	»	»	»	...	...	○
2	»	»	»	»	0 26	0·31	
3	91·0	»	»	»	...	...	
4 S	92·2	»	»	»	...	...	
5	97·2	»	»	»	...	...	
6	96 2	»	»	»	...	...	
7	97·3	»	»	»	...	...	
8	100·2	»	»	»	...	...	☾
9	94·0	»	»	»	...	...	
10	91·5	»	»	»	...	...	
11 S	95·1	»	»	»	...	...	
12	90·5	»	»	»	0·30	0·37	
13	90·7	»	»	»	0·06	0·12	
14	91·8	»	»	»	0·65	0·70	
15	90·2	»	»	»	0·05	0 08	●
16	92·5	»	»	»	0·44	0·50	
17	85 0	»	»	»	...	...	
18 S	93·9	»	»	»	0·12	0·18	
19	90·5	»	»	»	...	...	
20	99·0	»	»	»	0·07	0·12	
21	96 2	»	»	»	...	...	
22	95 8	»	»	»	...	...	☽
23	99·5	»	»	»	...	...	
24	98·4	»	»	»	...	...	
25 S	100·5	»	»	»	3 19	0·26	
26	101 9	»	»	»	...	...	
27	100·5	»	»	»	...	...	
28	100·4	»	»	»	...	...	
29	99·8	»	»	»	...	...	
30	97·9	»	»	»	...	...	○
Mean.	94·3				1·88	2·33	

These Observations having been made for the most part with a supply of new and first rate Instruments, received into the Observatory, by orders of the Bengal Government, a brief description of the Instruments seems necessary.

1st. The Barometer is a standard Instrument by Newman, diameter of the tube 0·504 Inches. The following is the comparative shewing of this Instrument and those Barometers which were in use at the Observatory prior to 1st of June 1844.

Ditto » » » » » » » » » » 0·514 ditto.

2nd The Thermometer is a standard Instrument by Newman, on metal Scale and graduated to 1-5th of a degree.

3rd. Wet Bulb Hygrometer by Newman, graduated to single degree divisions, the difference between Standard Thermometer and dry Thermometer of this Instrument is +0·2. The Temperature of the Dry bulb is taken from the Standard Thermometer, and in the event of the quantity moisture, dew point, or dryness, being required, it is necessary the difference adverted to be taken into calculation.

The difference between these instruments, and the Standard Thermometer, is+ 0·7 for the former ,and—.93 for the latter.

The above Instruments are fixed at about 4½ feet from the ground, to a post in a thickly chuppered house, and are freely exposed to the air, and sheltered from any influence of Solar reflection.

On the 23rd and 24th, the Weather Cock was repairing, no observations taken on those days.

Barometer by Troughton, used prior to the 1st of June 1844, Observations reduced to 32° Fahrenheit. - - - - - - - - - - - - - - - - - - 29·493

Do. Do. Colonel Everest, used from 1st of June to 31st August 1844, Observations reduced to 32° Fahrenheit. - - - - - - - - - - - - - - - - 29·637

No. 52. Standard Barometer by Newman, used from 1st of September 1844, reduced to 32° Fahrenheit. - - - - - - - - - - - - - - - - - - 29·654

No. 86. Ditto Ditto Ditto from 3d of April 1847, Ditto Ditto - - - - - - - - - - - - - - - - - - 29·667

H. D. SHUILLIER,
Offg. Deputy Surveyor-General,
In charge Surveyor-General's Office.

No. X.

Extracts from the Log of the Ketch "Ceylon Island."

On 12th April, was within 25 miles of Colombo in Ceylon, when at 7 A. M. the wind became very violent at E.S.E., the sea high, and much rain fell. It was a heavy gale, and obliged the vessel to put back, and accordingly she ran W.N.W.

On the 13th.—At 8 A. M. the wind at S.S.E. abated, and the vessel again stood towards Colombo.

On the 14th.—At 7 A. M. the wind veered by East to South, and the course was shifted to South by East.

On the 15th.—At 4 A. M. the wind was South by East to S.E., very strong with much spray, accompanied by violent gusts of wind and rain, making it difficult to steer the vessel. The sea washing over the sides, no resource was left but to shift the vessel's course again. It blew tremendously.

On the 16th.—Same wind, lost the mizen top-mast, cross-jack yards, and had all the sails blown away. The hold began filling with water at the rate of 14 inches the first half hour, afterwards faster; the pumps were kept constantly going night and day, scudding before it.

On the 17th.—The wind was South, blowing a gale, and the course was west.

On the 18th.—The wind South, and still violent, steering North. Got a sight of the sun. Latitude 9° 14′ North.

On the 19th.—Same gale, S.W. very heavy, the spray considerable, and the sea washing over the sides of the vessel.—Latitude 11° 11′ North.

On the 20th.—A heavy S.W. gale, steering N.W.—Latitude 12° 42′ North.

21st.—Gale moderating at West.—Latitude 14° 19′ West..

22nd. Do. at West.—Latitude 15° 39′ North.

23rd.—Moderate wind at N. W.—Latitude 16° 20′ North.

[The above extracts are compiled from three or four accounts, differing from one another in important points, but all shewing the vessel being in a gale from 12th to 20th April.]

No. XI.

Ship "Buckinghamshire," from London to Bombay.—Captain's Journal.

Sunday, 11th April, 1847.—P. M., Light breeze at NNE, and fine clear weather. Departed this life Mariano Francisco. Sun-set, lowered the top-sails to a squall at Northward. A. M., calm. Most of the Chinese, and all the Manilla men, sick of the scurvy: many dead others dying. Invited all of them that were able, to come to Divine service, to implore the great God in whose hands are the issues of life. They came cheerfully, which could not be expected from them under ordinary circumstances.

Latitude observed 5° 17′ North, Longitude 67° 50′ East. Barometer 29·92, Sympiesometer 29·91, Thermometer 89.

Monday, 12th April.—P. M., Variable light winds, with squalls.

At 2 A. M. a waterspout approached the ship. Barometer 29·88, Symp. 29·82. At 3 A. M., a steady N.N.W. breeze set in and continued to increase. Latitude observed 5° 41′ North, longitude 68° 38′. Gt. Barometer 29·86, Symp. 29·84, Thermometer 86½. Sick—1st Officer, 2 Europeans, 5 Lascars, 11 Chinese, and 13 Manilla-men.

Tuesday, 13th April.—Fresh breeze at NNW. At 8 P. M., cloudy with lightning all round. A. M., Fresh breeze at Northward, and cloudy.

Latitude observed, 7° 11′ North, Longitude 70° 49′ East, Barometer 29·86, Symp. 29·84, Thermometer 86½. Sick, 1st Officer, 2 Europeans, 5 Lascars, 11 Chinese, and 13 Manilla-men.

Wednesday, 14th April.—P. M. Fresh breezes at N. Westward, and fine weather.

Midnight squally, constant rain, much lightning. Barometer 29·86, Symp. 29·86. A. M. Wind at N.N.E. and Northward, with fine weather.

Latitude observed, 8° 18′ North, longitude 72° 56′ East. Barometer 29·85 Symp. 29·84, Thermometer 81½. Sick—1st Officer, &c.

Ship Buckinghamshire from London to Bombay.

H.	K.	F.	Courses.	Winds.	Barom.	Sympiesr.	Thermom.	Remarks. April 15th, 1847.
1	9		N E ¾ E	N W by N	29·72	.....	.....	Strong breeze & cloudy. In
2	8	4	....	.....	29·72	29·74	83	Royals 0 | 40 P M, saw the
3	6	4	N E by E ½ E	.....	29·72	29 73	84	Island of Monicoy from aloft.
4	5		E N E	Northerly	29·70	29·69	.....	1 | 30 Monicoy by SE E by S. Increased breeze, with a very threatening appearance to the Eastward.
5	5		.....	.....	29·67	29·69	.....	In top gallant sails and bonnet of the rib.
6	5		E by N	N by E	.....	.....	.....	In 1st Reefs.
7	4		.....	.....	29·71	29·71	.....	Heavy squall at Northward, carried away both F. sail-sheets
8	3	4	.....	.....	29·70	29·72	.....	Dismally dark night, with the most vivid lightning.
9	3		.....	.....	29·75	29·76	80½	Fresh gales, hard squalls, and constant heavy rain.
10	2	4	N W by N	N E by Ely	.....	.....	.....	Split the Fore-top-sail, fore-sail, & main-sail.
11	2	4	N N W	.....	.....	.....	.....	
12	2	4	....	.....	29·74	29·75	81	Midnight, fresh gales with constant heavy rain & lightning
1	3		N by W	.....	.....	.....	.....	
2	3		.....	.....	.....	.....	.....	
3	2		.....	.....	.....	.....	.....	
4	2		.....	.....	29·67	29·71	80½	
5	3		.....	.....	.....	29·74	.....	
6	3		.....	.....	29·71	.....	.....	Bent the best fore-sail and set it.
7	3		.....	.....	.....	.....	.....	Fresh gales, severe squalls, & a heavy sea.
8	3		.....	.....	.....	.....	.....	
9	2		N by W ½ W	.....	.....	.....	.....	Passed a Maldiva Boat scudding before the gale.
10	2		.....	.....	.....	.....	.....	
11	2		.....	.....	.....	.....	.....	Fresh gales and cloudy.
12	2		.....	.....	29·67	29·72	81	Latitude observed, 9° 0′ N.; long 73° 4′ East.
								Remarks. Friday, 16th April.
1	3		N N W ½ W	N Easterly	.....	.....	.....	Heavy sea at Eastward.
2	3	4	.....	N E by E	29·64	29·72	81	Fresh gales and constant rain.
3	3	4	.....	.....	.....	.....	.....	
4	3	4	.....	.....	29·64	29·71	81	Double reefed main and mizen top-sails.
5	3		.....	.....	.....	.....	.....	Down Royal Yards.
6	3		.....	.....	29·71	29·73	81½	Wore ship.
7	3	4	S E	.....	.....	.....	.....	
8	4		.....	.....	29·72	29·71	81	Heavy head sea.
9	2		.....	.....	.....	.....	.....	
10	2		.....	.....	29·73	29·73	81½	
11	3	4	.....	.....	.....	.....	.....	Fresh gales with severe squalls of rain.
12	3		.....	.....	29·69	29·70	81½	

Ship Buckinghamshire from London to Bombay.

H.	K.	F.	Courses.	Winds.	Barom.	Sympiesr.	Thermom.	Remarks. Friday, 16th April, 1847.
1	3							
2	2	4			29·58	29·60	80½	Cleared up, and furled fore-sail
3	2	4						
4	1	4	S E by E	N Easterly	29·51	29·55	81	Strong gale and cloudy
5	1	4						Very high sea
6	1	4			29·51	29·54	81	
7	1	4		N E by N		29·61		
8	1	4			29·60	29·63	81	
9	1	4						Noon, hard gale with a very high sea
10	1	4			29·58	29·61	82	
11	1	4						latitude observed, long pr Chro-
12	1	4		N by E	29·53	29·57	81½	nometer 72° 58′ East

Ship Buckinghamshire, off Minicoy, off Cochin, and off Goa, scudding before a Southerly Gale

April, 1847.

								Remarks. Saturday, 17th April.
1	3	4	E S E	N by E				Fresh gales, hard squalls and
2	3	4	E by S ½ S	Northerly				rain, with a very high sea.
3	5	4						Kept away to sight Mini-
4	5	4						coy or to get to the East of
5	6	4	E S E	N by Wly				it before night, having ob-
6	6	4						tained a sight of the sun for longitude, but not for lat.— Sun-set, hard gales, heavy head sea, and violent squalls and rain
7	7	4	E N E	N N W				Bearing on the longitude of
8	7	4		N W				Minicoy, without seeing it,
9	7	4	N E by E	W N W				hauled up to E N Eastward,
10	8							Wind changing rapidly to
11	8							Westward, but the weather
12	7	4						not improving
								Midnight, hard gales, constant light rain and lightning to Northward
1	8			W S W	29·58	29·60	81½	
2	8							
3	8	4						
4	8	4	N E	S W by S				Squally, with heavy rain
5	8	4	N E by N					
6	8	4						
7	8	4	N N E					
8	9			S S Wly.				Let main-top-gallant-sail over the double reefs
9	9		N by E					
10	9	4						Sick, 1st Mate, 2 Europeans,
11	9	4						22 lascars, 11 Chinese, and 14
12	9	4	N ½ E	S by W ½ W				Manilla men.—Fresh gales, and squally. Lat. observed 10° 20′ N, long. 75° 5′ East

Ship Buckinghamshire, off Minicoy, off Cochin, and off Goa, scudding before a Southerly Gale, April, 1847.

H.	K.	F	Courses.	Winds.	Barom.	Sympiesr.	Thermom.	Remarks. Sunday, 18th April, 1847.
1	11		N N W	S by W				Strong gales, squalls & rain
2	11							
3	11							Sent the 2d fore-top-sail, and set it double-reefed.—Strong gale and thick weather
4	11	4						
5	11	4						
6	11	4						
7	11	4	N N W ½ W					
8	12							
9	12							
10	12							
11	12							
12	12							Midnight, strong gale and cloudy
1	12							
2	12							Strong gale, squally & lightning
3	11			Southerly		29·50		In main-top-gallant sail
4	11							
5	11							
6	11							At daylight passed a vessel with loss of topmasts and mizenmast, displaying a British Ensign inverted; she proved afterwards to be the "Mermaid," Rogers, from Bombay. She ran on shore, *sinking*, next day 5 miles below Vingorla.—At 8 A. M. passed an Arab ship with loss of Jibboom, Fore-top Gallant mast, and on starboard tack.—A. M. Threatening weather and all the glasses falling rapidly. Furled the mizen-top-sail; in an attempt to take in the main, kept the ship before it.
7	11		N W by N	S S E				
8	11							
9	11							
10	11			S E by S				
11	11							
12	11			S Easterly				
it ble	waw	Bar	ometer last mar ked		28·35	abt th	s time	
		ay at	noon, the gale be arg. to an extr		aord	inary d	egree	

Ship Buckinghamshire in a hurricane off Goa, 1847.

Remarks.—Monday, 19th April, 1847.

The gale blowing furiously and veering to the Eastward; cut the fore-sail from the yard and hauled it on deck. The fore top sail blew entirely away. At 0° 30' P. M., the ship inclined to broach to, cut away the mizen mast and kept her before it. Blowing a hurricane, blew away the main top mast, the hurricane increasing and the fore mast bending to its force. About 1 P. M. the foremast fell over starboard: a most furious gust blew away the main mast near the deck. The quarter boats blew away,

the starboard or large cutter flying across the poop. The poop ports having been blown in, the violence of the wind blew down the backheads, destroying the Barometers, and everything in the cabins. The ship covered with spray and labouring excessively in a tremendous sea, the rapidity of her motion tearing everything on the different decks and in the hold adrift. Men unable to stand on their legs, or to hear one another shout. Two o'clock, the wind, which had been for the last half hour indescribably furious, suddenly ceased entirely.

The Simpiesometer in the calm continued to stand at 28·08. The fore and mainmast, which had got under the bottom, were now cut adrift. The ship covered with aquatic birds, thousands of them dying on the deck. About 4 P. M., the wind that had ceased at E.S.E. or East, began to blow with equal fury at W.N.W. The ship was again enveloped with the sea, and labouring with a violence that nothing could resist—3½ feet water in the hold. At 9 P. M., the wind abating, Sympiesometer 28·96. At midnight moderate wind at westward, Sympiesometer 29·1. Daylight, squally at westward. Commenced rigging a jury foremast; Chinese at the pumps. At 9 A. M., saw the Vingorla rocks by NE½E; crew at the pumps. Noon, squally at westward, with showers.

Ship Buckinghamshire dismasted, bearing up for Vingorla.

H. REMARKS.—TUESDAY, 20TH APRIL, 1847.

1.—Set the foretopmast staysail and a foretop gallantsail on the Jury foremast, and bore up for Vingorla.
4.—Westerly breeze and squally. Passing about 2' South of the Vingorla Rocks.
7.—Light breeze and squally with showers. S. Vingorla Rock W. ½ N. At 7·30 anchored with the larboard bower in 9½ fathoms.
10.—Burnt blue lights.
12.—Fresh westerly breezes.
6.—Turned the men out to the pumps.
8.—A vessel with only her foremast standing, and steering by a spar over the stern, running in to the rocks.
11.—Fresh W.S.W. breeze, and fine. The stranger firing guns.
12.—Sent a letter on shore in a water cask.

Ship Buckinghamshire off Vingorla.

H. REMARKS.—WEDNESDAY, 21ST APRIL, 1847.

1.—Moderate Westerly wind and squally.
3.—Moderate W.S.Westerly breeze and cloudy.
(We have been since told that Major-General Morse came down to the beach this afternoon and offered Rs. 200 to any boat that would come off to us; but although the weather was moderate, such was the terror caused by the recent loss of life and property, that there were no volunteers.)
11.—Variable and squally night, heavy rain.
6.—Squally with heavy rain. Filled some casks with rain water, salt water having found its way into the ship's tanks during the hurricane.
10.—Collecting pieces of beef and pork, and other provisions, amongst the coals, the casks having been smashed.
12.—Fresh breeze and squally. Rigging a jury mainmast.

No. XII.

Log of the Ship Faize Rubahny, from Bombay towards China.
Mr. R. Sargent, Commander.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks. Thursday, April 15th, 1847.
1	5		S E ½ S	.....	.....	P. M. Light Westerly breeze and fine weather. Crew employed as most useful
2	5	4	S E by S	Westerly	.....	
3	5	4	.....	.....	.....	
4	5	4	.....	.....	.....	
5	3	4	.....	.....	.....	
6	5		.....	N W	.....	
7	5		.....	.....	.....	
8	5		.....	.....	.....	8h, Moderate breeze and hazy weather
9	8		.....	.....	.....	
10	6		.....	.....	.....	
11	6		.....	.....	.....	
12	4		.....	.....	.....	
1	3		.....	.....	.....	Midnight, ditto wind and weather
2	1	4	.....	.....	.....	A M ditto weather
3			Calm	.....	.....	
4	2		S East	Variable	.....	4h, Variable, decreasing breeze and hazy weather
5	1	4	.....	.....	.....	
6	2		.....	.....	.....	P S at 14 inches
7	1	4	S E by S	.....	.....	Daylight, variable air and calms
8			.....	.....	.....	A confused sea. Carried away the Starboard Fore-Lift, shifted the main-top gallant sail to repair
9			.....	.....	.....	
10			.....	.....	.....	
11			.....	.....	.....	Latitude observed, 12° 18′
12			.....	.....	.....	Longitude Chron 75° 20′ about
						Remarks. Friday, April 16th, 1847.
1	1	4	S S W	S E by S	.....	P M, Strong breeze with hazy weather, with a high sea
2	4		.....	.....	.....	
3	4		.....	.....	.....	
4	4		South	.....	.....	At 4, increasing breeze. In a heavy scud against a high sea, pitched away the fore-top-gallant-mast, and sprung the main-mast about 3 feet above the rigging. At 6h, took in the main-top-gallant-sail. 6h 30, increasing to a gale. Hauled the main-sail up and stowed the jib. 8h, in taking a reef in the fore-top-sail carried away the sheet and split the sail, furl'd it
5	2	4	.....	.....	.....	
6	2	4	.....	.....	.....	
7	2		.....	.....	.....	
8	2		S S W	.....	.....	
9	2		.....	.....	.....	
10	2		.....	.....	.....	
11	3		.....	.....	.....	
12	3		.....	Vble to S E	.....	Midnight, strong breeze with a very high sea. In 1st reef the main-top-sail, and close reefed the mizen-top-sail, and furl'd it.
1	4		South	Hzy. Shry.	.....	
2	4		.....	.....	.....	
3	4		.....	.....	.....	

Log of the Ship Faize Rubahny continued.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks. Friday, April 16th, 1847.
4	4		... ...	... ...	...	
5	3		S by E	.. ...	...	
6	3		... ...	... ...	...	Day light, moderate gale, pitched
7	2		... ...	... ...	...	away the flying jibboom, unbent the fore-top-sail to repair
8	2		... ...	... ...	...	
9	2		... ...	... ...	...	
10	2		N E by N	... ...	...	Wore ship to the Northward
11	2		... ...	... ...	...	Noon do wind and weather
12	2		... .	... ...	...	Latitude observed, 11° 19′ 0″ North Longitude Chron. 75° 32′ 0″
						Remarks. Saturday, 17th April.
1	2		N E by N	E S E	...	P. M. Strong gale with a high sea,
2	2		... ...	... ...	...	ship pitching very deep at times, taking a great quantity of water on deck
3	2		... ...	... ...	...	
4	2		... ...	... ...	...	At 4 wore ship to Southward
5	3		South	... ...	...	
6	3		... ...	... ...	...	At 6 bont the fore-top-sail, and set it reef'd
7	3	4	S S E	Varble to E	...	
8	3	4	S E by S	... ...	...	8h, increasing gale with rain
9	2		S S E	E	...	
10	2		... ...	... ...	...	Midnight, a hard gale with a high
11	2		... .	... ...	...	head sea; took in the main-sail, ship pitching and labouring very
12	2		... ...	... ...	...	heavy, and taking great quantity of water on deck. P. S. every hour at 14 inches
1	2	4	S S W	Vble to S E	...	At 4 reef'd the fore-top-sail and furl'd the mizen
2	2	4	... ...	... ...	...	At daylight a very heavy gale with a
3	2		... ...	... ...	...	tremendous sea struck the vessel, wash'd away the lee quarter boat, and strained the ship greatly fore and aft
4	2		... ...	... ...	...	At 6h 30, found the ship making a greater quantity of water than
5	2		... ...	... ...	...	usual, found 2 feet of water in her well. At 7h 3°, the water gained
6	2		... ...	... ...	...	on both pumps, the injury sustained from the heavy weather, deemed it necessary for the preservation
7	2		N N W	... ...	...	of ship and cargo, to bear up before the wind, and to lighten the
8	6	4	... ...	... ...	...	ship. Threw 18 bales of cotton over board, and clear'd the decks
9	6	4	... ...	... ...	...	of all spare spars, new rope, &c, &c. At 8h 30, ship shipping a
10	6	4	... ...	... ...	...	heavy sea, which laid her leading blocks under water, ship occasionally motionless. Cut away the main-
11	6	4	... ...	... ...	...	top-sail and mizen-sail from the yards, not being able to take them in: ship making 30 inches of water per hour, both pumps constantly going

Log of the Ship Faize Rubahny continued.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks. Saturday, April 17th, 1847.
12	6	4	... ...	... ...	...	Noon, blowing a very hard gale with tremendous heavy squalls of wind and rain. A very high sea running, occasionally burying the ship fore and aft. Pumps constantly going. No observation
						Remarks. Sunday, April 18th, 1847.
1	6	4	North	S E S	...	P. M. Commencing with a very heavy
2	6	4	... ...	... ...	...	gale and violent squalls of wind and
3	6	4	... ...	... ...	...	rain, tremendous sea running All hands employed at the pumps, making 30 inches per hour
4	6	4	... ...	... ...	...	Midnight do wind and weather
5	6		... ...	... ...	...	All hands employed at the pumps,
6	6		... ...	... ...	...	constantly going, 30 inches water in the well. At 3 A. M. not being
7	6		... ...	... ...	...	able to steer the ship, broached to to port, taking the head yards back, a tremendous heavy sea
8	6		N N W	S E	...	striking her counter and carried away the tiller chains, upper brace, and the two lower gudgins or
9	6		... ...	... ...	...	pintles, the rudder apparently hanging by the upper pintle and gudgin. Lashed the helm to star-
10	6		... ...	... ...	...	board and got a lashing on the rudder head to stern port, not
11	6		... ...	... ...	...	being able for want of strength to get the head yards braced round
12	6		... ...	... ...	...	and filled upon, the crew being ex- hausted at the pumps. The sea struck heavily against her counter
1	6		... ...	... ...	...	frame, and caused her to strain fore and aft
2	6		... ...	... ...	...	6h, A ship passed us standing to the NW; showed a signal of distress, the Ensign Union down, of which
3	6		... ...	... ...	...	she took no notice. Lashed the helm to port and the head yards filling, got her before the wind and
4	6		... ...	... ...	...	brought to on the starboard tack, and the wind about the beam, in
5	5	4	... ...	... ...	...	wearing the fore-top-sail blew out of the bolt rope, pitched away the jibboom and the starboard quarter
6	5	4	... ...	Wore ship	...	boat, filling from a heavy sea, breaking over the poop, carried away the davits and lost the boat
7	1		East	... ...	...	also, washed the long boat out of the chocks into the lee waste and
8	1		... ...	... ...	...	stove her, secured her to the lee rail
9	1		... ...		...	
10	1		... ...		...	Noon, blowing excessively hard with heavy squalls of wind. All hands
11	1		... ...		...	employed at the pumps, 30 inches
12	1		... ...		...	of water throughout the 24 hours.
				Noon, no observ.	...	
					...	
					...	

Log of the Ship Faize Rubahny continued.

H.	K.	F.	Courses.	Winds.	Lee Way	Remarks. Monday, April 19th, 1847.
1	1		East	South	...	P. M. commences with do wind and weather
2	1		... ...	... ...	...	At 3 washed away part of the lee quarter gallery
3	1		... ...	... ...	...	
4	1		... ...	... ...	...	
5	1		... ...	... ...	...	Sun set do wind and weather, all hands at the pumps
6	1		... ...	... ...	...	
7	1		... ...	... ..	...	Midnight, light wind and seas; sounded in 30 fathoms
8	1		... ...	... ...	...	
9	1		... ...	... ...	...	Day light, made the land between Cape Ramos and St George's Island.
10	1		... ...	... ...	...	At 6 anchored in 8 fathoms water,
11	1		... ...	... ...	...	with 2 feet of water in the hold, to
12	1		... ...	... ...	...	repair damages, to enable us to get
1	1		... ...	... ...	...	to Bombay
2	1		... ...	... ...	...	Noon, decreasing breeze with cloudy
3	1		... ...	... ...	...	weather. Cape Mayon NNW½W
4	1		... ...	... ...	...	Cape Ramos south and by east
5	1		... ...	... ...	...	St George's Island N W
6	1		... ...	... ...	...	Pump'd the ship out dry, making 10 inches of water per hour at anchor
						Latitude observed, 15° 19′ North.
						Remarks. Tuesday, April 20th, 1847.
1			... ...	... ...	...	P. M. Crew employed at the pumps
2			... ...	S W	...	
3			... ...	... ...	...	
4			... ...	... ...	...	
5			... ...	... ...	...	
6			... ...	... ...	...	4h, Moderate gale with heavy squalls
7			... ...	... ...	...	of wind and rain; carpenters em-
8			... ...	... ...	...	ployed fitting a top mast cap for
9			... ...	... ...	...	rudder, brace on the stern port,
10			... ...	... ...	...	seacunnies repairing sail for bending
11			... ...	... ...	...	
12			... ...	... ...	...	
1			... .	S W	...	
2			... ...	... ...	...	
3			... ...	... ...	...	Midnight, do weather
4			... ...	... ...	...	A.M. do weather
5			... ...	... ...	...	
6			... ...	... ...	...	
7			... ...	... ...	...	
8			... ...	... ...	...	Noon, strong breezes with heavy
9			... ...	... ...	...	passing squalls of wind and rain
10			... ...	... ...	...	
11			... ...	S W	...	P. S. every 2 hours throughout the
12			... ...	... ...	...	24, at 1 foot per hour

Log of the Ship Faize Rubahny continued.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks. Wednesday, April 21st, 1847.
1			... ...	... ...	...	P. M. Crew employed repairing damages
2			... ...	S W	...	
3			... ...	... ...	...	Carpenters employed at the rudder
4			... ...	... ...	...	Seacunnies repairing sail for bending
5			... ...	... ...	...	
6			... ...	... ...	...	
7			... ...	... ...	...	
8			... ...	S W	...	Midnight, strong breezes with heavy
9			... ...	... ...	...	passing squalls of wind and rain
10			... ...	... ...	...	
11			... ...	... ...	...	
12			... ...	... ...	...	
1			... ...	... ...	...	
2			... ...	... ...	...	Daylight, do wind and weather
3			... ...	... ...	...	
4			... ...	... ...	...	
5			... ...	S W	...	9h, bent the fore-sail and main-top-sail in 2d reef and furled it
6			... ...	... ...	...	
7			... ...	... ...	...	
8			... ...	... ...	...	
9			... ...	... ...	...	
10			... ...	.. ...	...	Noon, moderate breeze and hazy
11			... ...	... ...	...	weather, Pump ship as yesterday.
12			... ...	... ...	...	

No. XIII.

Extracts from the Log of the late Ship Mermaid.

H.	K	F.	Courses.	Winds.	Lee Way	Remarks &c.—Saturday, 17th April, 1847.
1	3		S E by S	S S W	..	P. M., Light increasing sea breeze and fine, Barometer 29·48
2	3	4	S E	....	..	
3	3	4	....	....	..	5h P. M. Mangalore flagstaff East 7 miles
4	3	4	....	....	..	
5	3		S E by E ½ E	....	..	Sunset tacked to the Southward and Westward in 15 fathoms
6	2	4	W S W	South	..	Cloudy over the land
7	2		....	....	..	At 8h, moderate land wind and hazy
8	4	4	S W	S S E	..	
9	5		....	....	..	At 10 sounded in 19 fathoms, increasing breeze and
10	5	4	S S W	S E	..	hazy
11	6		....	....	..	Midnight, fresh breeze and cloudy; in top-gallant
12	6	4	S by E	S E by E	..	sails, sounded in 22 fathoms, Barometer 29·46
1	7		....	....	..	A. M Fresh breeze and cloudy with rain at times
2	7		....	....	1	in 2nd reefs, in one
3	6		....	....	1	At 5h 30 Mount Dilly ENE, about 20 miles
4	5		....	....	1½	Daylight, increasing breeze and squally
5	5		....	....	1½	In mainsail, jib, and spanker
6	5		South	E S E	2	Barometer 29·46. A fresh breeze with violent squalls at times, close reefed the top-sail. At 10h Barometer 29·40. In fore-sail and fore-top-sail
7	5		....	....	2	and laid the ship too under close reefed main and mizen-top-sails, and mizen-stay-sails. Breeze in-

Log of the late Ship Mermaid continued.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks &c. Saturday, 17th April, 1847.
8	5				..	creasing to a regular gale, 2 feet 6 inches in the hold, both pumps kept going. At 11h, heavy gale with tremendous sea running, ship labouring and pitching heavily. 11 30 all 3 bobstays carried away, secured the bow-sprit with end of the messenger sent up to the capstern through the hawsehole. At 11 45, carried away flying jib-boom, fore and main-top-mast, and mizen-top-gallant-mast. Barometer 29·35. Noon, severe gale and cloudy, Sun obscured, no observation, Soundings 50 fathoms.
9	4				..	
10	2		S S W		..	
11	2				..	
12	1	4			..	Latitude ascertained, 11.38 North
						Remarks &c. Sunday, 18th April, 1847.
1	...	4	off W S W	S E	4	P. M. Continued heavy gale and a heavy sea running; both pumps kept going, without diminishing the water. Barometer 29 36. People clearing away the wreck, the quarter boats and gig fill and carried away the davits. At 2 30, Mizen-stay carried away, and sprung the mast severely, fitted a preventer stay, 3 feet 6 inches in the hold. At 4 30, found it necessary to cut away the mizen-mast, as it worked the poop very much, and enabled the ship to be kept away. At 5h, finding it impossible to make any progress to the southward, determined on putting back for Bombay. At 5h, set a sail on the fore-mast and bore away. Well, 6, Barometer 29·40. Midnight increasing gale, with heavy rain, lightning and thunder. 4h A. M., more moderate, Barometer 29·47, both pumps kept constantly going. Daylight, saw a ship going the same way, under close reefs; hoisted signal of distress but she took no notice
2	...	4	on S S W		4	
3	...	4			4	
4	...	4			4	
5	...	4			4	
6	5	4	N W	South	..	
7	6				..	
8	6				..	
9	6				..	
10	6				..	
11	6				.	
12	7				..	
1	7				.	
2	7				..	
3	7	4		S S W	..	
4	7	4			..	
5	7	4			..	
6	7	4			..	
7	7	4		S W	..	
8	7	4			..	
9	7	4			..	
10	7	4	N by W	West	....	
11	7	4			..	Noon steady gale and cloudy, with a heavy sea on; ship labouring and rolling heavily, 5 feet water in the hold, all hands at the pumps. Sun obscured, no observation
12	7	4		W S W	..	Latitude ascertained 13·52 North. Soundings, 35 fathoms, Barometer 29·50
						Remarks &c. Monday, 19th April, 1847.
1	7	4	N N W	W S W	5·8	P. M. Steady gale with heavy sea, both pumps constantly going, crew much exhausted, Bar. 29·50
2	7	4			..	
3	7	4			..	
4	7				..	
5	7				..	Sunset, passed a large ship, hove to on the starboard tack
6	6	4	N by W	West	..	
7	6				6 ft.	Sounded in 30 fathoms
8	6				..	At 8h, gale more moderate, with severe squalls at times, accompanied with lightning, thunder and rain
9	6				..	
10	6		North		..	
11	5				..	
12	5				7 ft	Midnight, do. weather. Barometer 29·51, Sounded 27 fathoms
1	4	4	N by E	W N W	...	A. M. do weather
2	4	4			..	
3	4				by W	At 4h, decreasing breeze with severe squalls at times
4	5				S	
5	5				...	Daylight, do weather. Extremes of land NE to SE by E, distance about 15 miles
6	5				..	

Log of the late Ship Mermaid continued.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks &c. Monday, 19th April, 1847.
7	5				..	At 9h A. M., the wind hauling round to the Northward and Westward, and the ship making much lee way, bore away for anchorage. At 10, came to, with the best bower in 7 fathoms, and veered out to 70 fathoms, ship riding easily. At 11 30, 8 feet 6 inches in the hold, and after half an hour's close attention, found the ship making at the rate of 3 feet an hour, and apparently settling fast; upon which determined (for the safety of the crew and cargo) to beach the ship; consequently slipped the cable and run for the shore. At 12 30, ship grounded, bumped heavily, and came broadside on at Machemar (fishing village,) 5 miles south of Vingorla.
8	5				3½	
9	5		N E	N W	..	
10					..	
11					..	
12					..	

No. XIV.

Information collected at the Master Attendant's Office, Bombay, by Norman Oliver, Esq.

Bombay, 28th April, 1847.

Sumsoodeen, a Lascar of the Pattamar Alowboody, from Tellicherry bound to Bombay, states that we left Tellicherry 15 days ago, or on the 14th instant, and when near Goa 3 days after, we experienced a very strong gale of wind with little rain. We put off for 3 days and nights, but the gale was still increasing and continued so for 7 days. When the wind commenced to abate we turned and made for shore, and arrived safe in Razapoor River. We threw overboard part of our cargo, consisting of pepper, sandalwood, cocoanuts, &c. We saw no Pattamar or any large vessel, but several articles, such as cocoanuts, firewood, cotton bundles, &c., were seen floating. We remained two days in the Razapoor River, but heard no account of the gale as we were anchored at a place where there was no other vessel. The *wind was first blowing from the land side, and afterwards from the opposite direction.*

Doonva, a Lascar of the Pattamar Nubbeebux, arrived yesterday from Barcole. States we left Barcole on or about the 15th instant, and experienced a heavy gale when near Malwan, we therefore put off and remained so for 3 days. During this time the wind blowing very hard from the land side and the sea running very high. We threw overboard a quantity of stores which we had on board for Bombay. After 3 days the wind moderated, and we were three days more in coming towards the land. We came near Jaitapoor, when the weather became fine. We saw several articles floating, but no dead body, or any vessel in distress.

Madoo, a Lascar of the Pattamar Sacry Sallamity, arrived yesterday from Coomta, states that we left Coomta about 12 days ago; three days after we came near Razapoor, where we met a very strong gale from the land side; we put the

vessel outside for three days, when the wind changed and blew from the opposite direction; we were three days making the land, and arrived at Jaigur when the gale was entirely over. We received no injury to the vessel, but were obliged to throw over board a quantity of cotton in bundles, which we had shipped from Coomta. We saw several articles floating on the sea, but no human body.

The 29th April, 1847.

SHAICK ADAM, Tindel of the Pattamar Labsavoy from Ponany, arrived at Bombay last night. States that we left Ponany on the 2nd of this month, and arrived near Jaigad river on the 17th. On the following day it commenced blowing hard from the East, and in the middle of the day the wind blew in a heavy gale with a tremendous sea, and at 5 P. M. the wind shifted to SE with heavy rain. We were at anchor at this time near the river, and when the wind shifted to the S.E. we put in the river, where we remained 4 days. Whilst at anchor outside the river, we saw a Pattamar swamped at some distance from us, and on account of the heavy sea we were obliged to throw overboard a number of cocoanuts, and happily we received no injury to the vessel or to any one on board her, but a small boat which was secured on board was carried away during the gale and recovered next day by the people on shore, who restored it to us, but a part of the stern broken.

The 3rd May, 1847.

TENDAL TANNA, of the Pattamar Hunmuntpersad, from Tellicherry, arrived at Bombay on the evening of the 1st instant, states that he left Tellicherry about a month ago, and experienced a very heavy gale of wind when near Rutnagherry on or about the 18th of last month; the gale commenced blowing first from the East and shifted to the west two days after. We put off to sea and came to Rutnagherry 7 days after, when the gale had moderated. We threw over board sandalwood, pepper, and various other articles, and on our arrival at Rutnagherry we were amazed to see the extensive destruction of houses and trees which the gale had blown away and totally uprooted. We met no dead bodies, and saw no wrecks whatever. We had two sails torn in the gale, which we repaired at Rutnagherry.

NOOROODEEN, a Lascar of the Pattamar Towcully from Allepy, arrived at Bombay on the 1st instant, evening, states that the vessel left Allepy on the 9th or 10th of last month, and experienced a heavy gale on the night of the 17th when near Dewgur. It commenced from the east, and on Sunday morning we put in the Razapoor River, where we remained until the wind had moderated, which was on Wednesday the 24th. We suffered no injury to the vessel, and saw nothing.

The 12th May, 1847.

AHMED, Syrang of the Bugla Salmy, wrecked off Goa in the late gale, states that the Bugla Salmy, Nacodah Abdul Latib, bound from Mangalore to Muscat,

left the former port about a month ago, with a cargo of rice, &c., and 3 days after experienced a very heavy gale at night near Goa; she cast two heavy anchors in 12 fathoms of water. The wind blowing exceedingly strong from the landside Eastward. At 4 A. M., the Nacoda observed the vessel in a leaky state, and when the leak increased to about waist deep, he ordered to throw overboard a quantity of cargo, and before about 400 robins were thrown overboard the vessel sunk down, which was about the break of day. The crew, consisting in all of 125 persons, all perished except 22 men, some of whom sat on water tanks, some took hold of pieces of wood and were in sea for 3 days, when the wind shifted to SW, and the men were drifted on shore to the south of Vingorla.

No. XV.

Extract from the Log Book of the Bombay Steam Navigation Company's Steamer Victoria, during her passage from Bombay to Colombo. (civil time.)

H.	K.	F.	Courses.	Winds.	Remarks. Friday, 16th April, 1847.
1	5	4	S S E	Easterly	A M fresh breezes and fine weather
2	5	4			
3	5	4			3,45 Mangalore Light bore east
4	5	4			5,30 Mangalore flagstaff bore N by E and Barn Hill E by S
5	5	4			A heavy ground swell setting to the west; crew washing decks &c.
6	5	4			
7	5	4			
8	5	4	S S E		Set all possible sail, crew variously employed
9	5	4			
10	5	4			
11	5	4			In all sails. A heavy swell at Northward. Noon fresh southerly winds and cloudy weather. Bearing at noon Barn Hills N by W, and mount Dilly S E by S
12	5	4		Southerly	A heavy swell and cloudy weather. Lat. observed 12°15′ N
1	4	4	S S E	S Easterly	P M fresh S Easterly wind and cloudy weather
2	4	4			
3	4	4			
4	4	4			
5	4	4			
6	3		S E ½ E	Fresh	E S E winds and cloudy weather with drizzling rain
7	3				
8	3		S E		Mount Dilly bore N N W
9	3				Cannanore light S E by E ½ E
10	3				Anchored off Cannanore in 4½ fathoms water and veered chain to 300 fathoms on the best bower
11					Heavy swell, ship rolling tremendously.
12					A boat came from the shore but would not take any thing on shore, likewise refused to take the mail; surf increasing considerably with continued rain from the S Easterly. Remarks running into Cannanore—Running into anchorage about 9 P M, the light bearing about S E by E, the man in the chain giving 4½ faths, the vessel received a sudden shock, but proceeded on; sounded the wells, but found she made no water.
					Remarks. Saturday, 17th April, 1847.
1					A M, Increasing surf, squally weather, wind about E S E.
2					At 2 found the vessel labouring so heavy got the steam up and the chain unshackled at 45 faths. ready to ship
3					

Log of the Steamer Victoria continued.

H.	K.	F.	Courses.	Winds.	Remarks &c.—Saturday, 17th April, 1847.
4					with a buoy to it, and the surf was making a clean breach
5					over her, taking with it the whole of the bulwarks from
6					the starboard side, filling the gig, washing oars out of
7					her, bending the davits, and carried away the side lad-
8					ders; ship labouring and rolling tremendously, the large
9					rollers striking her with great fury, and a great deal of
10					water going down the hatchways. Crew constantly at the
11					pumps.—6. The Steamer *Hugh Lindsay* got under weigh,
12					and stood out through the rollers, pitching and rolling
					awfully.—6. 30. Finding the rollers to be coming in with
					more force, making clean breaches over her, and wash-
					ing everything overboard with it, deemed it prudent
					to stand out to sea for the safety of all on board: ac-
					cordingly slipped from the anchor, set all sail, and stood
Winds	Battened all the Hatches down.	E S E.			through the surf; pitching and rolling a great deal.
Bar.	29·75				Stood out S S W till 9 A. M. In all sail, and sent the yards,
					mizen-top-mast and fore-top-mast gallant-mast down on
					deck. Strong gales, with a heavy sea and showers of rain.
					Ship labouring very heavy, carrying away more of the
					bulwarks, head bulwarks, and quarters. The *Hugh Lind-
					say* in company—split the fore-top-mast stay-sail. Noon,
					Gale increasing and ship rolling and pitching, thought it
					prudent for the safety of all on board, to throw overboard
					the heavy pieces of iron work belonging to the cranes on
					freight: accordingly set all hands to work, and threw 9
					pieces of them overboard, and found the vessel to lay
					too much easier; crew constantly at the pumps through-
					out.—2 P. M. Heavy gusts of wind and heavy rain; split
					the mainsail in rags, and carried away the jaws of the
					gaff; got the storm mizen up, and bent it to the gaff, and
					lashed the gaff to the mast and set the sail; ship still
					labouring very heavy and making about 5 inches of wa-
					ter per hour, and the engines working very slow—about
Bar.	29.	70			5 revolutions per minute. A great deal of water coming
					through the waste water pipes, heading W S W off West;
					wind S S W.—8. Heavy gales, attended with heavy south-
					erly squalls and heavy rain; crew constantly at the pumps,
					with all servants assisting. Ship giving heavy lurches,
					started the paddle box, easing the engines, making about
					5 revolutions per minute.—10 P. M. Lost sight of the
					Hugh Lindsay light, ship labouring awfully, the seas
					striking with great violence under the sponson, and
					staving the after paddle box cabins.—Midnight. Strong
					gale and tremendous sea, ship labouring heavy through-
					out, pumps constantly going. During the time of the
					roller breaking over the vessel, one of the cabin ports
					was dashed in and filled the cabin with water, washing
					overboard one of the skylights belonging to the ladies'
					cabins, henroops, three sheep, two pigs, and a quantity of
					chairs off the poop.

Log of the Steamer Victoria continued.

H.	K.	F.	Courses.	Winds.	Remarks &c.—Sunday, 18th April, 1847.
1	Engines going very slow throughout, making from 5 to 6 revolutions per minute.		Up S S W	Southerly	Strong gales attended with heavy rain and squalls, ship labouring heavy throughout. Crew constantly at the pumps, ship making about 5 inches per hour. Threw four cases of mango plants overboard, to the south eastward, and set the fore-try-sails; crew constantly at the pumps; wind moderating a *great deal*, but attended with constant squalls and heavy rain.
2			..	..	
3			Off	..	
4			Southerly	..	
5			..	Bar. 29·70	
6			To	..	
7			..	Wore ship	
8			W S W	..	
9			Up S E	..	
10			..	..	
11			Off South	..	
12			..	Bar. 29·90	Noon. Fresh breezes and thick cloudy southerly weather, attended with constant heavy squalls and heavy rain. Ship labouring heavy, crew constantly at the pumps throughout.—P. M., heavy squalls from the southward, attended with heavy rain; ship making about 5 inches per hour.—1. 30. Wore ship, a heavy sea still running.
1	...	..	S E	..	
2	...	..	S S E	..	
3	...	...	..	..	
4	...	...	W S W	..	
5	Up	...	S W by S	..	3 30. Barn hill bore N E ½ E, and southern extremes
6	off	...	S W ½ W	..	of the land S E by E.
7	...	...	..	..	8. 30. Requiring to stand to the eastward, tried to bring
8	...	...	..	..	the ship's head to the wind, but finding the engines
9	1	4	S E	..	would scarcely move, set the stay-sail and wore
10	1	4	...	...	making about ship and set fore-top-sail.—Midnight.
11	1	4	5 Points Lee	way ..	Heavy squalls and hard rain throughout; swell in-
12	1	4	...	Southerly	creasing, and ship labouring very heavy; pumps constantly going.
					Remarks, &c.—Monday, 19th April, 1847.
1	..	...	S E by S	Southerly	A. M. Hard squalls attended with heavy rain.—1. 45.
2	...	..	..	..	Sounded in 15 fathoms, tacked ship to the westward.
3	...	..	S S E	..	—6 Wore ship to the southward, thick.
4	...	..	...	..	The Engineers reported that the slide rods were bent
5	...	..	W S W	..	and side rods strained, and framing strained badly,
6	...	..	..	..	in consequence of the heavy weather.—Daylight. Got
7	..	..	S E by E	Southerly	the spare best bower out of the after hold, put it over the bows and bent the chain to it.
8	..	..	..	..	3. Mangalore flagstaff bore S E by E, crew getting all the
9	...	..	..	..	coals out of the holds, short of coals.—11. Found the
10	...	..	..	...	engines were not making more than 6 revolutions per
11	...	..	..	..	minute, and her head falling off in shore. Let go the
12	..	...	..	..	best bower anchor in 6 fathoms water, and veered
1	...	..	..	..	chain to 35 fathoms, with Mangalore flagstaff bearing S E by E.—Noon. Hard squalls and heavy rain; swell decreased considerably on anchoring from a strong set to the northward. Engineers overhauling the engines &c.
2	...	..	..	..	
3	...	..	...	..	
4	...	.	..	Southerly	Hard southerly squalls and heavy rain throughout; crew getting coals out of the fore holds, and pumping ship every four hours at 4 and 5 inches.
5	...	..	..	..	
6	...	..	..	..	
7	...	..	..	..	
8	...	..	..	..	
9	...	..	..	Southy. W	Set the watch.
10	..	..	..	..	
11	..	..	..	..	Midnight. Strong southerly squalls and heavy rain, and
12	..	..	..	..	a heavy ground swell throughout.
					Remarks, &c.—Tuesday, 20th April, 1847.
1	..	..	..	S by W	A. M. Strong southerly squalls and heavy rain through-
2	..	..	..	..	out, a heavy ground swell setting in, ship labouring
3	..	..	..	..	heavy.
4	..	..	..	..	
5	..	...	..	..	
6	..	..	..	..	Daylight. Crew employed getting all the coals up,

Log of the Steamer Victoria continued.

H.	K.	F.	Courses.	Winds.	Remarks, &c.—Tuesday, 20th April, 1847.
7	..	..	..	..	sweeping the holds, and putting them in the bunkers.
8	..	..	...	..	Sent down the fore gaff and sail, and bent it to the
9	..	..	..	..	main-mast for mainsail. Pumping ship every four
10	..	..	..	..	hours at 5 inches.
11	..	..	..	..	Noon. Fresh W S W squalls and heavy rain, and veering
12	...	..	...	..	round to the north westward with cabins.
					After repeated signals to the shore, and finding no boat coming off to us, determined to run down to
1	..	..	..	..	Cannanore.—P. M. Fresh southerly squalls and
2	..	..	S ½ E	..	hazy weather.—2 Up anchor and proceeded down the
3	6	...	..	..	coast, and found the engines to work very well, 16
4	6	..	..	..	revolutions.—2 50. Mangalore flagstaff bore East.
5	6	..	S by E	..	Sent yard up and set sail to advantage.—6. 15. Barn hill
6	6	..	..	Southerly	bore N E by E. Mount Formosa, S E.
7	6	..	..	..	
8	6	..	S by E ½ E	..	
9	6	..	..	..	Engines' bilge pumps keeping her free.
10	6	...	..	..	Engines making 18 revolutions.
11	6	..	S S E	...	
12	6	..	..	..	Midnight. Light southerly squalls and drizzling rain. A strong current setting to the northward.
					Remarks, &c.—Wednesday, 21st April, 1847.
1	6	..	S E by S	Southerly	A. M. Light southerly squalls and drizzling rain. In
2	6	.	..	..	all sail.—2.30. Passed a large steamer at anchor. Mount
3	6	..	S E	..	Dilly bore S E about 6 miles.
4	6	..	..	..	
5	6	...	S E by S ½ S	..	3. Mount Dilly bore east. A strong current setting
6	6	...	East	...	at westward.
7	6	...	E S E	...	
8	6	..	..	..	8. Anchored off Cannanore with the best bower in 4½
9	..	...	..	..	faths. water. Flagstaff bore N E W. Commenced
10	..	..	..	..	taking in coals and discharging cargo.
11	..	..	..	..	
12	..	..	..	..	

No. XVI.

Ship Atiet Rohoman, from Mauritius, lying at Aleppee—S. Stewart, Commander,—1847.

H.	K.	F.	Courses.	Winds.	P. W.	Remarks, &c.—Thursday, 15th April, 1847.
1	..	..		N W	...	P. M.
2	..	..		S W	...	Moderate breezes and fine.
3	..	..	Steering in for Aleppee	Variable	...	Steering in for Aleppee.
4	..	..		E by S	18	
5	..	..		...	...	5. Came too with best bower in 6½ fathoms water,
6	..	..		...	...	veered to 35 fathoms cable in hawse, flagstaff
7	...	..		...	...	bearing E by S, about 3 miles off shore. Furled
8	...	..		E S E	18	sails and cleared up the decks.
9	...	..	..	...	...	
10	..	..	..	...	...	
11	..	..	..	...	...	
12	..	..	..	...	18	Midnight. Cloudy.
1	..	..	...	S E	...	A. M.
2	..	..	...	...	...	2. Heavy squalls from S S E.
3	..	..	..	S S E	...	Veered away cable to 75 fathoms before bitts.
4	..	...	...	...	18	
5	..	..		...	...	
6	..	..	At anchor	...	...	Daylight, moderate and cloudy.
7	..	..		...	...	
8	...	..		Easterly	18	8, Cloudy with rain. Pumped ship.
9	..	..		...	...	Employed getting all ready for discharing copper
10	..	...		...	...	and hoisting in water, also taking turns out of
11	..	...		...	...	larboard cable and coiling it away clear. At noon
12	...	...	...	N E by E	16	moderate breezes and cloudy, with drizzling rain.

Log of the Ship Atiet Rohoman continued.

H.	Winds.	P. W.	Remarks &c.—Friday, April 16th, 1847.
2	N E by E	..	P. M., Moderate breezes and cloudy, with drizzling rain.
4	E N E	16	
6	East	..	Sunset, do wind and weather.
8	..	16	Down royal yards.
10	E S E	..	
12	S E	16	Midnight, dark cloudy weather, with rain.
2	S S E	..	A. M.
4	S E	17	Cloudy with rain. At 8, crossed royal yards, people employed cleaning
6	E S E	...	paint works outside and variously; seacunnies and carpenters
8	East	17	as requisite.
10	..	...	
12	E N E	17	Noon, cloudy with constant rain.
			Remarks &c.—Saturday, April 17th, 1847.
2	East	..	P. M., increasing breezes, with rain.
4	E S E	17	
6	..	..	Sunset, strong breezes, sent down royal yards and rove top-gal-
8	S E	17	lant yard ropes.
10	..	..	
12	E S E	18	Midnight, heavy squalls, accompanied with heavy rain &c.
2	...	..	A. M.
4	..	18	Ditto wind and weather.
6	S E	..	
8	S S E	18	Ditto wind and weather.
10	..	..	
12	South	18	Noon, strong breezes and cloudy, with a heavy swell on.
			Remarks &c.—Sunday, April 18th, 1847.
2	S by E	...	P. M., Strong gale and rain, with a heavy sea on,—pumped ship.
4	S S E	18	
6	..	...	Sunset, sent down top gallant yards and rove top gallant mast
8	S E by S	16	ropes.
10	..	..	Midnight, heavy gusts of wind and rain, with the same sea.
12	S E	16	
2	...	..	A. M.
4	S E by S	16	Daylight, more moderate and less sea on; hove in to 45 fathoms of
6	..	..	bitts.
8	S S E	16	
10	..	..	
12	S by E	16	Noon, dirty squally weather, with rain, and sea increasing.
			Remarks &c.—Monday, April 19th, 1847.
2	S by E	...	P. M., Moderating but squally at times, with rain.
4	..	17	
6	South	..	Sunset, Do wind and weather.
8	..	17	
10	..	..	
12	S S E	17	Midnight, Do wind and weather.
2	..	..	A. M.
4	S E by S	17	Daylight, hove shore to 15 fathoms, 8, Crossed top gallant and
6	..	..	royal yards.—10, made sail and weighed, to work ship farther in
8	S E	17	shore.
10	..	..	
12	..	18	Noon, light breezes and fine. Employed working ship

No. XVII.

Extract from the Log of the H. C. Steam Ship Sesostris, from Aden, towards Cannanore.

[Received from Captain Lynch, I. N.]

Date. 1847.	Hour.	Knots.	Course.	Wind. Direction.	Wind. Force.	General Remarks.
					3	
April 16th.	1	7·4	E	N N E	C M	
	2	7	..	..	..	
	3	7	..	..	..	
	4	7	..	N by E	2	Under all sail. Heavy swell from the South Eastward.—(Signed) T. G. C.
	5	7	..	..	..	
	6	7	....	..	..	
	7	7	..	..	..	
	8	7	..	..	..	
					3	
	9	7	..	N N E	N M	
	10	7	..	..	..	
	11	7	..	..	..	Lat. ob. 13·15. Long. clv. 70.28.17
	12	7	..	..	..	Lat. acc. 13·29. Long. acc. 70.33 E
					3	
	1	7 6	E	N N E	B C	
	2	7·6	..	..	..	
	3	7·6	..	..	..	
	4	7·6	..	..	..	
	5	7·6	..	..	....	
	6	7·6	..	..	..	Lightning to eastward.
	7	7·6	..	..	..	
					4	
	8	7·6	..	..	O P C	
	9	7·4	..	..	..	
	10	7·4	..	..	..	
	11	7·4	..	..	5	Vivid lightning to eastward, with
					0 2	very dark threatening appear-
	12	7·4	..	..	L	ance.
					3	
April 17th.	1	8	E	N E by N	2 R	
					L	
	2	2·4	N	W S W	..	1 40, Taken aback at the 2nd in a
	3	1·4	W	..	..	hard squall, in all sails and
	4	4	W N W	N E	3	furled. 1 20, sounded 17 fthms.
					O R	Sd. qr. 0·17 to 19·22. 22.25.
	5	3	N W	..	..	30. 1 | 30 continued vivid light-
	6	3	..	N	..	ning. 1 to 2, fresh breeze, and
	7	6·6	E	..	..	cloudy squally with heavy rain.
	8	7·6	..	..	4	3, decreasing breeze.
					O 2 R	
	9	6	..	N N E	..	
	10	5·4	..	E N E	..	
	11	4	..	..	5	Lat. ob. none. Long. clv. 72.7.30
	12	2	..	..	..	Lat. acc. 13·28. Long. acc. 72.49
					6	
	1	3	E by S	N E	O 2 R	
	2	3	N by W ½ W	..	..	
	3	3	..	..	..	
	4	3	..	..	..	
	5	2	N W	..	....	
	6	1·4	..	..	..	Fresh gale and heavy sea. 3, shut
	7	1·4	....	..	..	off port boiler, vessel rolling
	8	1	..	..	..	heavily, moderate gale and heavy
	9	2	N W W	at N	..	sea, with hard squalls.
	10	2	..	to N N E	....	
	11	2	....	..	..	
	12	2	..	..	..	
					5	
April 18th.	1	3	N W ½ N	N N E	O R	
					L	
	2	3·2	..	..	..	
	3	3	..	..	..	Daylight, decreasing sea and
	4	3	..	..	....	breeze, heavy rain.
	5	2	N W by W ½ W	W	..	During the gale the sea was

Log of the Steamer Sesostris continued.

Date. 1847.	Hour.	Knots.	Course.	Wind. Direction.	Wind. Force.	General Remarks.
					4	very heavy, rising in high pyramidal masses, which led me to remark at the time that it was blowing much harder to windward or to the N. E. of east than we had it.
April 18th.	6	2	..	..	B C 2	
	7	2	N W	N	..	
	8	1	E N E	..	..	
					5	
	9	3	..	..	O P C	
	10	3	..	..	..	
	11	3	..	..	..	Lat. ob. 13·52. Long. elv. 71·13. E.
	12	3	..	..	..	Lat. acct. 13·55. Long. acct. 71·49.
					4	
	1	h to	N E	N	2 R	P. M.
	2	4	E	..	..	Squally with rain.
	3	4	..	..	..	
	4	4	..	..	..	
					0	
	5	4	...	..	P 2	
	6	4	..	W N W	...	
	7	4	..	..	..	
	8	4	..	...	..	
	9	4	..	..	..	Swayed up top gallant mast.
	10	4	..	..	3	Heavy N. Westerly swell.
	11	4	..	..	6 P 2	
	12	4	..	...	..	
					3	
April 19th.	1	4·2	E	W	O 2 P R	
	2	4·2	..	..	..	Heavy confused swell, passing squalls, vessel rolling heavily. 5.30 taken aback, braced round.
	3	4·2	..	..	..	
	4	4·2	..	...	..	
	5	4·4	..	S b b	4	
		2	E S E			
	6	2¼	S E	&	C 0	
	7	4·4	..	S W	5 C R	
					3	
	8	5	..	W N W	L M	
					4	
	9	7	..	..	B M	
	10	7	..	..	O C	
	11	6·4	..	...	..	Lat. ob. 13·28. Long. elv. 73.14·15
	12	6·4	..	..	..	Lat. acct. 13·30. Long. acct. 72·44.
		3	S E			
	1	3	S E ½ S	S W	4	
	2	..	..	..	B C 2	
	3	..	...	..	..	
	4	..	.	..	..	
	5	..	S S W	..	..	
	6	..	..	..	..	
	7	..	..	..	..	
	8	..	..	..	..	
	9	..	..	..	..	
	10	..	..	...	..	
	11	...	..	...	..	
	12	..	..	...	...	
April 20th.	1	5	S E ½ S	S W	4 P C	A. M., Squally appearance; in top gallant sail, and outer jib.
	2	5	..	...	...	
	3	5	..	..	..	
	4	5	...	..	..	Daylight moderate and squally; sounded every hour 1.35.
	5	5·4	..	...	..	
					3	
	6	5	..	..	B M	
	7	6	..	..	..	9·48, Set fore top and top gallant studding sail; sounded, 35 fathoms.
	8	5	..	..	..	
	9	4	E S E	S S W	...	
	10	4	..	...	..	Malabar Coast in sight to Eastward.
	11	4	..	..	..	
	12	4	..	..	..	

Log of the Steamer Sesostris continued.

Date. 1847	Hour.	Knots.	Course.	Wind. Direction.	Wind. Force.	General Remarks.
April 20th.	1	4	S E by S	S S W	2 B C M	
	2	3·4	..	..	..	
	3	3	...	S b b	..	
	4	3	..	at	2 B C	
	5	2	..	S Westward	R 2	
	6	1	..	..	..	
	7	1	..	..	..	
	8	..	..	S E	..	
	9	..	..	..	...	
	10	..	.	..	6 C R	
	11	..	..	E	..	
	12	..	..	..	..	

No. XVIII.

Extract from the Log-book of the Ship Zemindar.

[Received from the Surgeon of the Zemindar, Dr Kennedy.]

April 1847.	Winds.	Barometer.	Latitude North.	Longitude East.	Sea, Wind, and Sky, &c.
10	N or N W	29·30	1·56	53·30	Sea smooth, wind light, and sky clear
11	..	..	2·50	54·25	do do do
12	..	..	4·6	54·55·15	do do do
13	S West	29	4·50	55·30·00	do do do
14	..	..	Sun obscure	57·57·00	Heavy swell from S & East, wind do
15	N East	29·30	5·42	56·06·45	do do and cloudy
16	N N E	30·00	6·23	56·21·00	do do and sky clear
17	N N W	30·00	6·57	57·12·00	Sea smooth do
18	West	30·00	7·42	57·39·00	do wind light and sky clear
19	S West	30·00	7·50	58·05·00	Heavy swell S W, wind and sky do
20	Calm	30·00	7·37	58·23·00	do do do
21	..	..	7·23	58·50.00	do do do
22	South W	29·30	7·56	59·29·00	Sea smooth, winds light, and sky do
23	S S West	29·30	9·02	60·23·30	do Fine breeze &c., do
24	S W est	29·30	10·56	61·59·15	do do do

No. XIX.

Extract from the Log-book of the Ship Swithamley.

Date.	Wind.	Its strength by the sail carried.	Lat. and Long. at Noon.	Sky, Clouds, Sea, &c. &c.
April 18th, 1847.	N W to W N W	Double reefed top sails, squally throughout, with thunder and lightning.	Lat. 12° 25′ N Long. 70° 15′ E	Gloomy to East and N E, clear to N W and West; very heavy swell from the N E.
19th	N W to West	All sail, excepting royals and F. jib.	Lat. 14° 39′ N Long. 71° 32′ 30″ E	Heavy overcharged clouds, with thunder and lightning; heavy sea from the N E.
20th	West	Double reefed top sails, royal yards sent down.	Lat. 17° 31′ N Long. 72° 00′ 00″ E	Dark gloomy weather, with heavy rain. Saw the sun set: it appeared quite double the usual size, colour fiery red. The N E sea running very high, and breaking at times.
21st	N W to W N W	First part double reefed; from 8 A. M. moderate: made sail accordingly, and continued firm till my arrival on the 22nd.	Lat. 17° 50′ N Long. 72° 20′ E	Sky clear and fine, and the N E sea quite disappeared.

Experienced on the 20th the height of the gale: it blew at times very hard. Obliged to lower the double-reefed topsails on the cap, and stood to the S S West, when I invariably found I ran out of the gale. These violent squalls always came on from eight to nine P. M., and continued two or three hours from N. E. to East, accompanied with heavy rain, lurid lightning, and long rumbling noise like stifled or distant thunder, but appeared quite above head. These N. E. squalls forced themselves up against a strong double-reefed breeze from the N. W., and west, leaving actually no calm space between the two winds, but took us flat aback. On the 20th it blew quite a gale of wind from the west to N. W.; washed a man from the jibboom, and lost him. With very hard carrying could bear double-reefed topsails. I consider I was in one of the spokes that led to the centre of the Hurricane, and had I continued standing to the E. S. E.ward in the N. E. squalls, would in all probability have been dismasted: it always kept clear to the westward and very black to the eastward; thus I chose to stand to the first.

J. Jennings,
Commander Ship *Swithamley*.

No. XX.

H. C. Steam Frigate Auckland, from Aden to Bombay.

Date 1847.		Direction of Wind.	Force of Do.	Latitude Noon Observation.	Longitude at noon Chronometer.	Remarks.
19th April.	A M	Easterly		North	East	1 h. 45 m. A. M. weighed and stood out of Aden; A. M., B C swell from the Eastward. P. M., B Midnight W, Ely swell.
		N E by N				
	P M	Easterly East	3	12°40′32″	46°51′00′	
20th ditto	A M	East		12 48 38	48 10	A. M. and P. M., B S Wly swell.
	P M	E by N	2			
21st ditto	A M	Easterly		13 23 32	50 18 43	A. M. & P. M. B Noon swell from the West. Midnight.. .. W Midnight do from the S East. Current N 60 W 16 miles.
		E by N				
	P M	Southerly S S E	1.2.4			
22nd ditto	A M	South		14 11 48	52 58	A. M. and P. M., B C; Midnight very heavy dew.
	P M	Southerly S S W	4			
23rd ditto	A M	S S W Variable	1	15 10	56 14	A. M. and P. M., B C; Midnight W S swell.
		S Westerly				
	P M	S S W	5			
24th ditto	A M	S S W	5	15 44	59 46 23	A. M. and P. M., B C, S Westerly swell, Current N E 12 miles.
	P M	S W	4			
25th ditto	A M	S W Variable at West to W S W	4.5.4.4	16 17	63 7 00	B. C., throughout; S Westerly swell. Current south 14 miles.
	P M	W S W	3			
26th ditto	A M	Southerly	3			
		Variable at S W to N W Light Variable N E		17 10	66 0 0	B. C., noon—B C P.
	P M		2			
27th ditto	A M	Variable N N E	2	17 50 38	68 45 14	S Westerly swell throughout. Noon, B. M., midnight B C. W. current S 57 E 15 miles.
		Variable N N W				
	P M	N N W	3			
28th ditto	A M	Variable at West to North	3	18 23	72 03 00	B., Southerly swell, current S 41. E. Anchored in Bombay harbour 0h 15m A. M. 29th.
	P M	N N W				

No. XXI.

Extract from the Log-book of the H. C. Surveying Brig Taptee, at anchor 12 miles West of Mandavie, Gulf of Cutch.

Date 1847.	Hours.	Winds.	Force.	Weather &c.	Date 1847.	Hours.	Winds.	Force.	Weather &c.
April 22nd	2	West	5	.	Ap. 23rd	2	W S W	5	Hy. pssg. clds
	4	..	5	Hazy		4	West	6	..
A. M.	6	W S W	..	..		6	..	..	..
	8	..	..	..	A. M.	8	..	5	Hazy
	10	..	4	..		10	S W by W	..	..
	12	...	..	..		12	..	..	...
	2	West	..	..		2	..	..	.
	4	W S W	...	..		4	..	6	Thick
P. M.	6	Westerly	5	..	P. M.	6	W S W	7	Cldy. weather
	8	..	..	..		8	..	5	..
	10	..	..	Tk. pssg. clds.		10	S W	5	..
	12	S Westerly	..	..		12	..	5	.

April 24th	2	S S W	5 to 6	Lightning to westward.
	4	..	5	
A. M.	6	N W	8	5 hours 30 minutes, hard squalls from N W, with thunder,
	8	..	5	lightning, and rain.
	10	..	4	6 hours 30 minutes, weighed and stood to W S Westward.
	12	S Easterly	2	Passing squalls, thick, cloudy westward.
	2	Calm	0	Noon, light variable airs, hauling round to S Eastward, threatening appearance to S Westward.
	4	Variable	1	4 hours 40 minutes, wind shifted suddenly to S S E, and
	6	S S E	9	increased to a fresh gale, in all sail, but fore top mast stunsail.
P. M.	8	..	8	6 hours, set foresail and main top sail double reefed.
				10 hours, occasional hard squalls, with very heavy rain; in foresail.
	10	..	8 to 9	Midnight, strong breezes with very hard squalls at times,
	12	..	8 to 10	continued rain, thunder, and lightning. Heavy S W swell.
April 25th	2	S S E	9	Moderate gale, with hard squalls and rain.
	4	S W	8	4 hours, wind hauling to S S W; to decreasing breezes set
A. M.	6	..	7	the courses, jib, and boom mainsail.
	8	..	...	
	10	S S W	6	Thick hazy weather, heavy S Westerly swell.
	12	...	4	
	2	S W	5	Hazy.
	4	..	4	...
	6	..	5	..
P. M.	8	..	4	Passing clouds.
	10	..	4	Do do.
	12	S W by W	4	.. On the 26th and 27th April we had nothing but light S Wly breezes, and fine weather.

No. XXII.

Extracts from Meteorological Register kept at Rajcote during latter part of April, 1847.

[Furnished by Colonel Sandwith, 23rd Regiment B. N. I.]

April, 1847	6 A. M.			10 A. M.			Noon.			4 P. M.			10 P. M.		
	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.
18	29·362	80	S S E	29·390	84	S S E	29·351	86	S by E	29·281	87	W N W	29·356	84	W N W
19	354	79	S S E	364	84	W N W	340	85	W N W	280	87	W	348	86	W N W
20	351	80	N E	380	85	N W	320	87	W	260	89	W N W	350	85	W S W
21	322	83	W S W	352	86	W N W	328	87	W N W	290	87	W N W	352	85	W N W
22	339	80	W S W	398	86	W N W	320	97	W N W	308	88	W N W	398	84	WN W
23	340	80	W S W	404	87	W S W	370	88	W S W	300	90	W S W	431	85	W S W
24	352	80	S W	443	86	S W	410	87	W N W	356	88	W S W	422	80	S W
25	380	80	S S W	430	84	S W	390	87	S W	356	87	S W	456	82	S W
26	442	80	S W	522	81	W S W	480	86	W S W	416	86	W N W	508	82	W S W

Remarks.

18.—Close and hot morning, wind S S E in the forenoon.

19.—Wind very variable, and weather sultry: out-door Thermometer at 4 P. M. 104°, and at 6 A. M., 76°.

20.—Clear sun shine all day. Hot and sultry at times. Out-door Thermometer in the shade, at 4 P. M. 106°.

21.—Very cool morning, at 5 A. M. out-door Thermometer 76°, wind strong to-day.

22.—Strong wind on sunrise; outside Thermometer at sunrise 79°, and at 4 P. M. 102°—wind high throughout the day—mostly sunshine all day, but occasional clouds about.

23.—Morning cool and cloudy—wind very high throughout the day; lightning in the north at 6½ P. M.

24.—Cool morning, wind high, large white clouds about—a few drops of rain fell at 1 P. M., slight thunder at 4 P. M.; lightning all round at 7 P. M., cloudy night.

25.—Very high wind early, a good shower at ½ past 8 A. M., hazy night, and much moisture in the air.

26.—Air full of moisture at sun rise.

No. XXIII.

MARINE DEPARTMENT, No. 1514.

Bombay Castle, 25th October, 1847.

SIR,—I am directed to acknowledge the receipt of your letter of the 18th ultimo, and in reply to communicate for your information the annexed copy of a letter from Lieutenant Montriou, in charge of the Observatory, dated the 29th idem.

I have the honor to be, Sir, your most obedient servant,

A. MALET, Chief Secretary.

To ALEXANDER THOM, Esq.,

Surgeon, Her Majesty's 86th Regiment, Poona.

No. 32 of 1847.

From Commander C. W. MONTRIOU, I. N.,

In charge Observatory,

To Commodore Sir ROBERT OLIVER, R. N.,

Superintendent Indian Navy.

SIR,—With reference to the memorandum No. 1455, of 1847, from the Assistant Superintendent, dated September 23rd, 1847, enclosing a letter from Dr. Thom, H. M. 86th Regiment, to the Military Secretary to Government, requesting that the ranges of the Tide Gauges at Bombay, Aden, and Kurrachee, might be sent to the Bombay Geographical Society, I have the honor to state that there is no Tide Gauge in operation at Kurrachee. The ranges of the one at Aden are, I believe, regularly transmitted every month from that place to the Bombay Geographical Society. A note on the Tides at Bombay, from the 13th to the 23rd of April, was sent by me to Dr. Thom.

There was a swell at the time of high water at Bombay from the 13th to the 23rd of April last, which was the only peculiarity in the Tides indicated by our Tide Gauge at the Observatory.

The Diagrams traced by the Tide Gauge at Aden, for the above month, shew no change from the ordinary Tides.

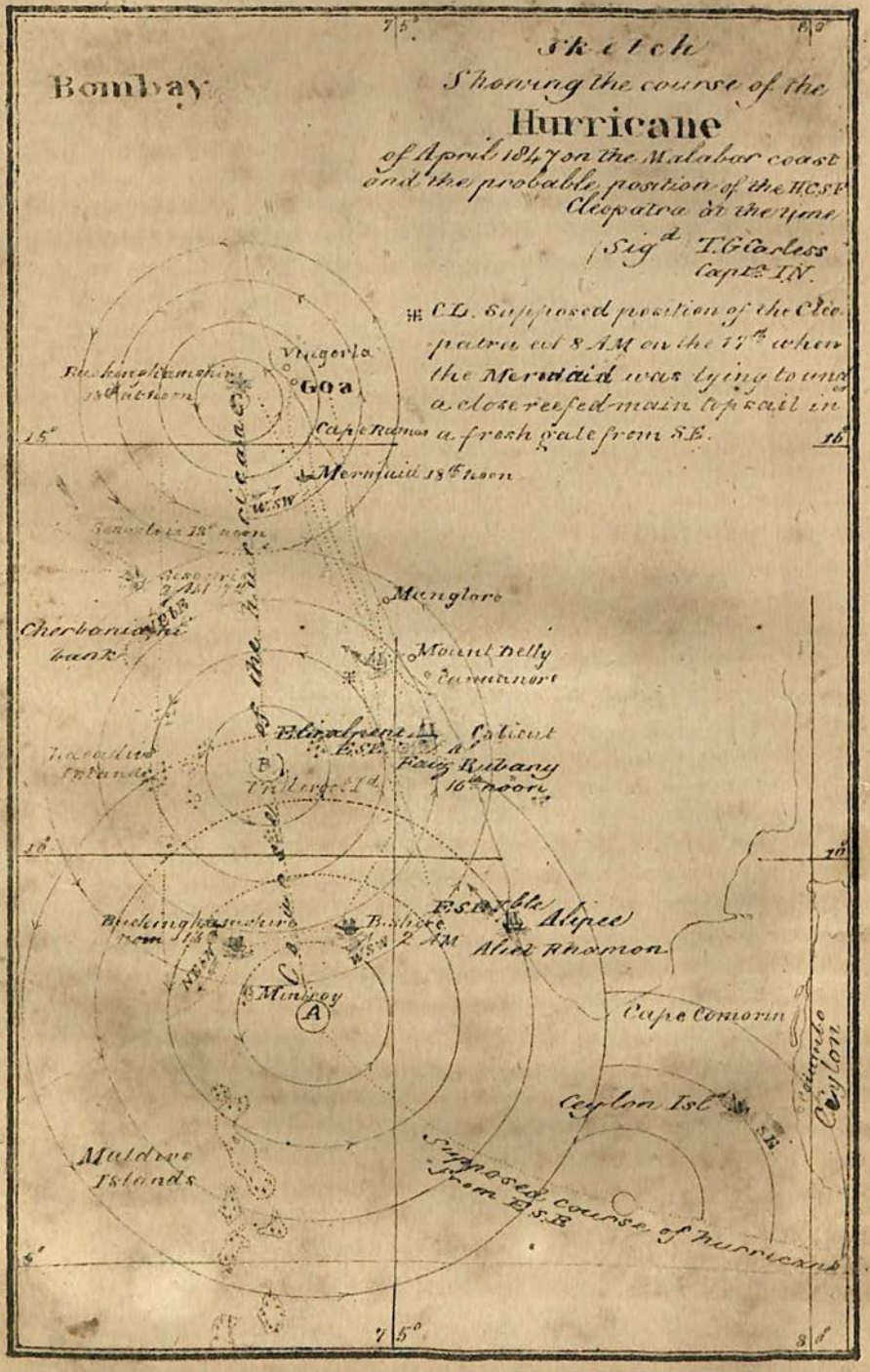
I have the honor to be, &c.,

(Signed,) C. W. MONTRIOU,

Commander I. N., in charge Observatory.

Observatory, Colaba, September 29th, 1847.

(True Copy.) A. MALET, Chief Secretary.


Sketch
Showing the course of the
Hurricane
of April 1847 on the Malabar coast
and the probable position of the H.C.S.S.
Cleopatra on the 9th
Sigd T. Carless
Capte I.N.
C.L. Supposed position of the Cleopatra at 8 AM on the 11th when the Mermaid was lying to under a close reefed main topsail in a fresh gale from S.E.
Bombay
Vingerla
Goa
Cape Ramas
Mermaid 18th noon
Mangalore
Mount Delly
Cannanore
Calicut
Tellicherry
Mahe
Pilot Rock
Chorbonicha Bank
Laccadive Islands
Minicoy
Cape Comorin
Ceylon Isle
Maldive Islands
Supposed course of Hurricane
from E.S.E.
Ceylon

ART. II.—*Remarks on the Course of the Hurricane which occurred on the Malabar Coast in April* 1847, *and on the probable position of the Steam Frigate "Cleopatra" at the time; with a sketch.* By Captain T. G. CARLESS, I. N.

[Presented by Government.]

THE following attempt to trace the Course of the Hurricane which occurred on the Malabar Coast in April 1847, is drawn up from the information obtained from the Log Books of the Steam Frigate *Sesostris,* steam vessel *Victoria,* and ships *Buckinghamshire, Mermaid, Faize Rubahny,* and *Atiet Rohoman.* The investigation furnishes another proof to those already afforded of the rotatory nature of these violent storms, and as I believe it is the first occurring on the Western Coast of India which has been submitted to examination, the subject possesses a peculiar interest.

At noon on the 16th April, it appears by the *Buckinghamshire's* Log that she was in Latitude 8° 45′ North, Longitude 73° 3′ E., with the wind blowing a hard gale from N.E. by N., and a very high sea. It is not stated what sail she was under, but as the foresail had been furled some time before, and her speed was reduced to half a knot per hour, I conclude she was lying to under a close reefed maintopsail. The *Faize Rubahny,* at the same time, was in Latitude 11° 16′ North, Longitude 75° 27′ E., with the gale moderate from E.S.E.; and the *Atiet Rohoman* at anchor off Aleppee, in Latitude 9° 25′ North, had squally weather, with the wind varying from East and E.S.E.

The data afforded by the direction of the wind at these points, although not so complete as could be wished, from the vessels being all in the upper half of the circle described by the Hurricane, is still sufficient to enable us to ascertain the vortex or centre round which it revolved with tolerable accuracy; and I am therefore induced, after an attentive consideration of the facts, to place it in Latitude 8° 3′ North, Longitude 74° 5′ E., at the spot marked A in the Chart. My belief in the correctness of this position is confirmed by observing that the *Buckinghamshire,* being nearest to it, experienced the gale strongest, and that, as she advanced to the Eastward, the wind veered gradually round from N.E. to North and W.N.W.; that at the *Faize Rubahny's* position in the N.E. quarter of the circle, upon its outer extremity, the wind was less violent, and from E.S.E.; and that the weather was still more moderate, and the breeze variable from East and S.E. at Aleppee, where the *Atiet Rohoman* was at anchor, which, as she was somewhat

nearer to the vortex than the *Faize Rubahny*, was probably owing to the interruption and disturbance caused in the course and strength of the gale by the high mountains in the vicinity. At this time the storm appears to have been revolving from right to left, looking to the northward, and this seems to have been the case throughout its duration. When the gale first reached the *Faize Rubahny*, and for several hours after, the *Mermaid*, about 90 miles from her, and standing from Mangalore to the Southward, had moderate winds and fine weather, which was also the case with the *Sesostris* Steam Frigate, then about 100 miles to the W.N.W. of the Cherbaniani Bank, and as they were entirely out of its influence, we can form some idea of the extent of space over which it prevailed, which a reference to the chart will show was a circle with a diameter of about 410 miles.

On the morning of the 17th, at 2 A. M., the gale first reached the *Sesostris*, *Mermaid*, and *Victoria*, and we have now more ample means of tracing its course and extent, as at that time the vessels were in different and opposite quarters of the circle. Their positions were as follows:—

Sesostris, Latitude 13° 14′ North, Longitude 72° 2′ E.—moderate gale from N.E. by E.

Buckinghamshire, Latitude 9° 5′ North, Longitude 74° 29′ E.—hard gale from W.S.W.

Mermaid, Latitude 12° 12′ North, Longitude 74° 50′ E.—fresh gale from SE.

Faize Rubahny, Latitude 11° 23′ North, Longitude 75° 35′ E.—heavy gale from S.E. close to her position at noon of the 16th.

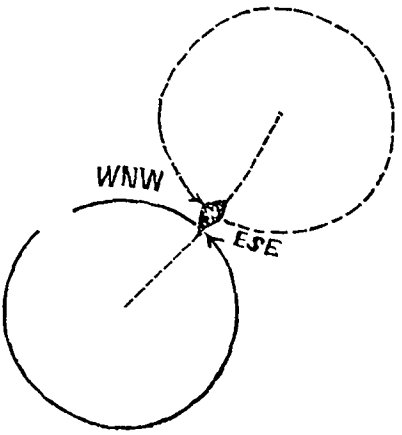
Victoria at Cannanore—moderate gale from E.S.E.

The direction of the wind at these different localities places the centre of the hurricane at this period near Underoot island (marked B in the Chart). The *Faize Rubahny* and *Mermaid*, who were nearest to it, experienced the worst weather. The latter, after lying to a few hours under a close reefed maintopsail, lost her maintopmast, and was obliged to cut away her mizenmast, and bear up before it; and the former, after having her sails blown from the yards, her quarter boats washed away, and heaving overboard a portion of her cargo, spars, &c., was obliged to follow her example. The *Victoria* steam vessel, although farther distant, also received considerable damage, and was under the necessity of throwing overboard some heavy cargo she

had on deck. The *Buckinghamshire*, being at a greater distance from the vortex, received no injury, and, although the wind was blowing a hard gale, stood on her course under a press of sail. At the N.W. extremity of the circle, the *Sesostris* had the gale more moderately, and on the S.E. side, where the *Atiet Rohoman* was at anchor, apparently a short distance outside it, the weather was merely squally and unsettled. From these facts it would appear that the storm circle had contracted considerably in its progress, and at this time did not exceed 300 miles in diameter.

Having thus ascertained the position of the centre of the hurricane at two different points, we are enabled to find its course, and estimate the rate at which it progressed. At noon on the 16th, its centre, as before stated, was found to be at A in the plan, and at 2 A. M. on the 17th, fourteen hours after, at B; and as the distance between these two points is 180 miles, it had moved in a N. by W. direction at the rate of thirteen miles per hour.

At noon on the 18th, the *Buckinghamshire* was between Vingorla and Goa, about 30 miles from the land: there the gale shifted suddenly, and blew most furiously from E.S.E. In the course of an hour all her sails were blown from the yards, her quarter boat blown away over the poop, and she lost all her masts. The violence and storming force of the wind is mentioned in her Log Book as indescribable. At 2 P. M. it fell suddenly calm, which continued until 4 P. M., when "the wind, which had died away at E. S. E., commenced with equal violence at W. N. W." She had, in fact, run into the vortex of the hurricane, which, moving upwards whilst she remained nearly stationary, caused the remarkable change of wind described above, as may be shown by the subjoined diagram.



At this time the *Mermaid* was about 50 miles to the S.S.E., running up with a fresh gale from W.S.W., with only her foremast standing, and five feet water in her hold. The *Sesostris*, 150 miles to the S.W., was standing to the Eastward, with a fresh breeze from N.W., being just without the limit of the hurricane circle. Her position again enables us to judge of its extent, which had apparently contracted to

still narrower limits, and now exhibited a diameter of only 225 miles. The distance from its centre at 2 A. M. on the 17th (B) to the spot where the *Buckinghamshire* was dismasted at noon on the 18th, (C) is 263 miles, and it had moved through this portion of its course in nearly a N.$\frac{1}{2}$W. line in 34 hours, at the rate of eight miles per hour, and had also approached within 40 miles of the coast.

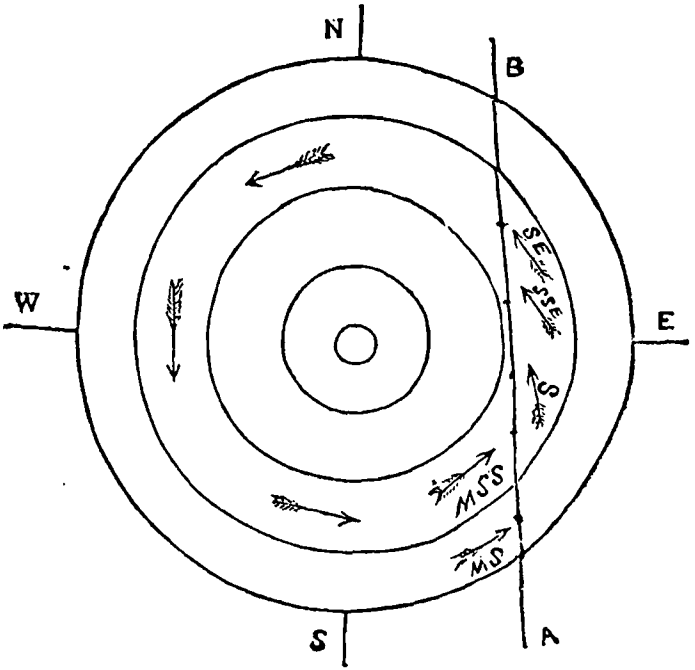
It is to be regretted that we have no means of ascertaining the track of the storm farther to the Southward and Eastward, and the direction from which it approached the continent of India. From what I have been able to glean from the imperfect information given by the native Commander of the Ketch *Ceylon Island*, I am induced to believe that it came from E.S.E., for he states that on the 15th April, when off Colombo, he had a gale from the S.E., in which he had all his sails blown away, lost his mizen topmast, crossjack yard, &c. and that, in standing to the N.W., it continued from that date veering gradually round to S.W., until the 21st, when it moderated: he farther mentions, that three days before, on the 12th, when about twenty-five miles from Colombo, he experienced a heavy gale from E.S.E., which obliged him to run before it for a whole day.

I shall now offer a few remarks on the course of some of the vessels.

At noon on the 16th, the *Buckinghamshire* was lying to with the gale from N.E. by N. The vortex of the storm was then a short distance to the S.E., and moving at a rapid rate to the North, passed ahead of her shortly after she stood to the E.N.E. under a press of sail; and during the day the wind veered gradually round from N.E. by N. to S.W. From noon of the 17th her course was about N.N.W., and she was going at the rate of 12 knots per hour, with a current of nearly two knots in her favour. As she was thus moving up with the hurricane in nearly the same direction, she remained the whole time in the S.E. quarter of the circle, and consequently had the wind steady from S.S.W. until noon of the 18th, when the line of her course, meeting that of the hurricane,—she had reached its vortex,—the wind changed suddenly to E.S.E., and blew with tremendous violence, and she was quickly rendered a mere wreck.

The centre of the storm circle passed near the *Mermaid* when she was lying to; and, as might be expected, the weather she experienced was most tempestuous. By bearing up, she followed the hurricane on a course slightly inclining towards its path, but as it progressed with

much greater velocity—her speed not exceeding four knots per hour,—it soon left her far behind. She received, however, so much damage that after the gale had subsided she was found to be in a sinking state, and her Commander was obliged to run her ashore near Vingorla, with only her foremast standing, and nine feet water in her hold. During the time she was running before the gale, the wind veered in 24 hours from S.E. to S.W. by the East, which is a proof that she was on the Eastern side of the storm circle, as the following diagram will show, the hurricane having moved over her in a N. by W. direction, from A to B.

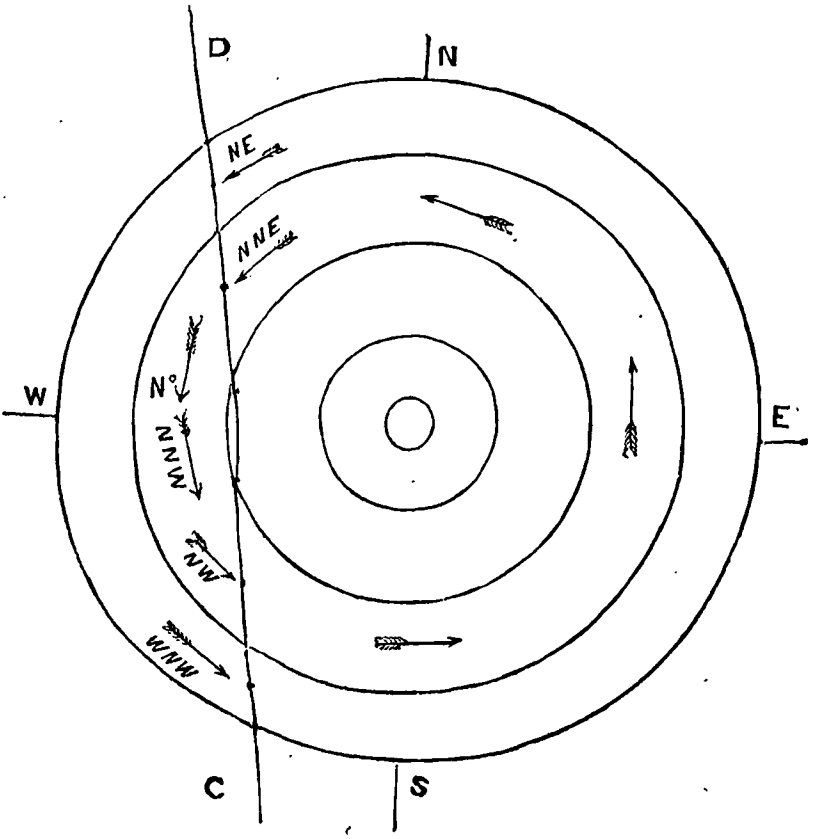


The *Faize Rubahny* being further to the Southward, and closer in shore, was somewhat farther removed from the centre of the storm, and the gale therefore was not so violent with her as the *Mermaid*, but as she also bore up and followed it, she continued exposed to its fury for a much longer period than would otherwise have been the case. Compared with the other two vessels, the damage she received was trifling.

The *Victoria* Steam Vessel, after being forced to leave the anchorage at Cannanore, kept close in shore with her head to the Southward, by which means, although she was driven 60 miles up the coast to Mangalore, she continued in a position outside that portion of the storm circle in which the greatest violence of the Hurricane, which

also quickly passed her, was experienced; and in consequence, at the time it reached its greatest height farther to the Northward, when the *Buckinghamshire* and *Mermaid* were dismasted, the wind had moderated where she was to a fresh breeze.

When the gale reached the *Sesostris* on the morning of the 17th, she was standing to the Eastward, but a few hours after wore round and steered N.W. She thus stood directly away from it, and, although her course was again altered on the following day to the Eastward, the hurricane had then passed above her, and she consequently met with much more moderate weather throughout than any of the other vessels. During the gale, the wind veered round from N.E. to W.N.W. by the Westward, which shows that she was in the Western half of the storm circle, as may be shown thus, the direction of its course being as before N. by W.—from C to D.*



* I may here remark, that in standing up the coast after the gale, the *Sesostris* passed the wrecks of a great number of boats between Mangalore and Vingorla, and that the sea was covered with fragments.

From the above facts I think the following inferences may be drawn.

1st. That the storm was rotatory, and turned from right to left, looking towards the North.

2nd. That it pursued a course along the Malabar Coast from the parallel of Cape Comorin to Vingorla, in a slightly-curved line, inclining towards the land, the general direction of which was about N. ½ W.

3rd. That at the Southern extremity of the coast it extended over a circle of about 400 miles in diameter, which contracted gradually to a diameter of 225 miles as it moved to the Northward.

4th. That between Cape Comorin and Calicut, it moved with an average velocity of thirteen miles per hour; and from the latter place to Vingorla, of eight miles per hour.

5th. That it increased in strength, and moved with less velocity, as it contracted, and that its greatest violence was experienced on the Malabar Coast, between Calicut and Vingorla, along a track about 150 miles in breadth.

6th. That, as far as can be ascertained, it appears to have approached the Continent of India from the E.S.E.

It would be highly interesting to trace the farther progress of this storm to the Northward, for, although its extreme violence appears to have been expended at or near Vingorla, there is some reason to believe that it still pursued its course along the land, and eventually reached the shores of Cutch. From the scanty information I have been able to obtain, the same rotatory movement of the atmosphere seems to have prevailed along the Coast for several days after, but without that degree of intensity that would prove destructive, for I find that at Bombay the wind veered between the 16th and 19th of April, from N.E. to South, and was accompanied on the 19th with considerable magnetic disturbance; and that, on the 24th, the *Taptee*, surveying vessel, experienced a fresh gale on the Cutch Coast, which veered round from S.S.E. to S.W., accompanied with a very threatening appearance to the South, and preceded several days by a heavy S.W. swell.

The Log Books of the vessels do not supply much information relative to the variations in the Barometer. In the *Buckinghamshire's* Log, the height of the Barometer and Sympiesometer is given at noon on the 15th, when the former was 29·67, and the latter 29·72. From

that date no observation appears until 2 P. M. on the 18th, when she was in the vortex of the hurricane. The Sympiesometer had then fallen to 28·80, and it appears to have remained at that height during the calm that succeeded, and until it had passed over her. At 6 A. M. on the 17th, the *Victoria's* Log shows the height of the Barometer to have been 29·83 at midnight; when she was nearest the centre of the storm it fell to 29·70; and at noon next day, when it had passed her, rose to 29·90. At midnight on the 16th, the Barometer on board the *Mermaid* was 29·84, and continued constantly falling until noon of the 18th, at the time she was nearest the vortex of the hurricane, when it stood at 29·34: two hours after, it rose to 29·38, but no further observations are recorded.

During the greatest violence of the hurricane, the quantity of electric matter in the atmosphere appears to have been very great. On the morning of the 17th, the lightning darted incessantly close around the *Sesostris* in intensely vivid flashes, and the rain poured down in torrents. The other vessels also experienced similar weather.

Probable position of the *Cleopatra* Steam Frigate during the hurricane :—

The log books of the vessels proceeding down the Coast supply information of the state of the winds and weather previous to the hurricane, and a tolerably accurate judgment may therefore be formed of the position of the *Cleopatra* when she first encountered it. On the morning of the 16th of April, the *Faize Rubahny* was below Cannanore, and had the wind strong from S.E., with a high sea. The *Victoria* steam vessel, at noon of the same day, was between Mangalore and Mount Delly, and had the wind fresh from the Southward and S.E., with a heavy swell, and her speed was reduced to 4½ knots, and after sunset to 3 knots per hour. On the morning of the 17th, the *Mermaid* was off Mount Delly under double reefed topsails, the wind blowing from S.E., and at 8 A. M. was lying to under close reefed maintopsails in a strong and rapidly increasing gale.

The *Cleopatra* left Bombay on the afternoon of the 14th, passing the outer light vessel at three o'clock, and, after making a sufficient offing, would naturally steer along the coast, at a distance of 25 or 30 miles from it, so as to pass between the Easternmost island of the Laccadive group and the main in mid-channel. With the assistance of her sails, I do not think her *average speed* could have exceeded 7½ knots per hour, or that she had run more than 338 miles up

to noon of the 16th, a period of 45 hours. She was therefore about 30 miles above Mangalore, and, as the *Victoria* had had the wind from the Southward and Eastward with a heavy swell when passing that place eight hours before, it is highly probable that by this time the S.E. breeze had also reached her. Allowing this to be the case, she had for the next twenty hours a heavy sea current, and constantly increasing wind against her, and could not have made more than 90 miles, estimating her average speed to have been 4½ knots per hour. This gives 428 miles as the whole distance run from Bombay, and places her at 8 A. M. on the 17th in Latitude 12° 5′ North, about 40 miles from the land, with Elicalpine Island, the nearest of the Laccadives, 50 miles to windward. At this time the *Mermaid* must have been very near her, and was lying to under a close reefed maintopsail in a heavy gale. Allowing even that her speed whilst running down the coast was greater than I have given her, which I do not think at all probable, she would only have met the gale a little earlier, and would not have advanced more than a few miles to the Southward of the spot in which I have placed her. From the account given in the log-books of the different vessels, of the weather they experienced on that part of the coast at the time, I have come to the conclusion that the *Cleopatra* could not have reached the Laccadive Islands at the period when the hurricane first reached her; and a reference to the Chart will show that she was nearer its vortex than the *Mermaid*, *Faize Rubahny*, or *Victoria*, and consequently must have been more exposed to its greatest violence than either of those vessels.

(Signed) T. G. CARLESS,
Captain, I. N.

BOMBAY, *August* 25, 1847.

(True copy.) A. MALET,
Chief Secretary.

ART. III.—*Account of a Journey from Soor to Jahlan, and thence to Ras Roves.* By Messrs WARD, SYLVESTER, and JAMES, of the Hon'ble Company's Surveying Brig *Palinurus*.

[Presented by Government.]

FRIDAY, *November 6th*, 1845.—Landed at Soor with Mr Cole, C. in C., the interpreter, who accompanied us for the purpose of arranging with the Sheik to accommodate us with camels and guides for our journey.

On arriving at the town, which is situated on the beach, we found that the Sheik was absent on business at the other town of Soor, about two

miles inland in a north-westerly direction. Said, the brother of the Sheik, took us to his house, and refreshed us with coffee and sweetmeats; whilst the inhabitants of the place completely filled the room in order to satisfy their curiosity by staring us out of countenance. We afterwards, accompanied by several natives, walked to the other town, which is very prettily situated in a grove of date trees, and contains a capital bazaar, and a fort, mounting three guns, built of mud. We were here conducted to the market place, where a seat was placed for us that we might wait the arrival of the Sheik, and underwent a scrutiny from the curious eyes of the natives. Some Banyans, of whom there were several, presented us with plaintains and sweet limes, which were gratefully accepted after our walk.

On the arrival of the Sheik, we returned to the town, followed by a numerous concourse of men, fully armed with swords, matchlocks, spears, &c., and having mounted us on camels, they performed a species of war-dance, accompanied with singing and firing their matchlocks, in honor of our visit. On arriving at the town, our interpreter, having agreed with the Sheik that he should provide us with camels and guides, returned to the vessel, and left us to enjoy the hospitality of the Sheik, who took us to his house, and served up to us an excellent fish curry, with dates and hulwa. We afterwards smoked a pipe with our host, and retired to rest in the house which he very politely placed at our disposal for the night.

On the following morning a considerable dispute arose as to the number of camels and men we should take, but it was at last decided that four camels, and the like number of men, would be sufficient. Before starting, an unfortunate accident occurred to the only watch we had amongst us. One of the slaves attending us, happening to see it wound up, imagined he could do it equally well, and taking it up unobserved, turned the key the wrong way, and so injured it that we lost the use of it during our subsequent journey, and were obliged in consequence to judge of the time by the sun. We tood leave of the Sheik and started on our journey, each having a camel, and the guides, riding in turn, on the fourth, first proceeding to the inland town to procure food for ourselves, attendants, and camels, consisting of dates, hulwa, and small cakes made of coarse flour.

Our route for the first six miles lay in a south-easterly direction, when we came to a well of fresh water in the midst of a date grove: having filled our water-skins, and allowed the camels to drink, we continued our journey, now in a south-westerly direction, over a hilly and very barren

country. Our road at this part skirted a ravine which had apparently been a water-course, continuous with the Khore at Soor. On arriving at its termination we took the following bearings:—Jibel Menkab, S. E. ½ E.; Jibel Minarf, E. by S. At about 8 P. M. we took up our quarters for the night in a small enclosure of trees, within a short distance of the camel-track. We were visited by two men of the Beni-boo-Ali tribe, who were passing on their way to Soor. A heavy dew fell during the night, wetting our bedding completely through.

At daylight we were awakened by the guides, who had lighted a fire from the dried wood about us, it being exceedingly cold, and having partaken of breakfast, consisting of dates &c., spread on a greasy sheepskin for a tablecloth, we mounted the camels and pursued our route in a south-westerly direction. At about 8 o'clock we reached a well, where we replenished our skins, and performed our oblutions in the best way we could. The country hereabouts presented nothing of particular interest, being very hilly, and here and there interspersed with stunted trees. We passed several flocks of sheep, tended by women, and attempted to strike a bargain, but in vain, as they would sell none but the very worst of the flock at a very unreasonable price.

At about 11 o'clock we halted in Wadee Talif, and here our guides procured a sheep, which they killed and dressed in a very original style, first cutting the meat from the bones, and grilling it, with the intestines, upon stones previously heated in the fire. Three men of the Beni-boo-Ali tribe joined us, and partook of the good cheer. At about 3. P. M. we resumed our route in the same direction, and over the same description of country, and halted for the night in Wadee Biah, the greasy sheepskin being again in requisition.

On the following morning we pursued our way in a W. S. Westerly direction. The country, as we approached the district of Jahlan, presented a more fertile appearance, the trees becoming more numerous, and of a larger growth, and the soil of a finer description. Several wild asses came within shot of us, and after staring for some time, took to their heels, running with considerable swiftness. As we gained the summit of a hill overlooking the valley of Jahlan, we descried the town of the Beni-boo-Hassan tribe about three miles distant, surrounded by groves of date trees, these being the first we had seen since our departure from Soor. The great hill of Jahlan is about seven miles distant from the town, although, from its immense size, it does not appear so distinct.

On approaching the mud wall which encloses a portion of the town, we were met by several of the tribe, who conducted us into the town,

where we were cordially received by Ali ben Saleen, the Sheik, a middle aged man with an intelligent cast of countenance, and standing upwards of six feet. A carpet was spread under the shade of one of the houses, and crowds of Arabs assembled to satisfy their curiosity: amongst them were two natives of Cutch, dyers by trade, who understood Hindoostani, and with their help we were enabled to carry on a conversation, and learned that on that day a peace had been concluded between themselves and the Beni-boo-Ali, and that a party, headed by Hamood ben Sabin, had proceeded to their town for the purpose of ratifying it. In the evening we were called to witness the return of the deputation, consisting of about fifty men mounted on camels, fully equipped for war. We were then introduced to Hamood ben Salin, the Sheik's brother, and leader of the expedition,—a most pleasing and intelligent young man, very superior to the generality of the Arabs we had seen before.

The town of the Beni-boo-Hassan is of considerable size, spreading over a large extent of ground. It is defended on the northern and eastern sides with a wall of mud, and here and there a fort of the same material: the houses are very irregularly built, and composed some of mud others of cadjan. That of the Sheik is much superior to the rest, being neatly built of cadjan, and nicely matted and carpetted in the interior. The walls were hung with glass bottles, and many articles of English manufacture, while a plentiful supply of earthenware was displayed on a species of shelf occupying one side of the apartment, and a double barrelled gun—a present from the Imaum of Muskat—hung in a conspicuous situation as being an article not a little prized by its owner.

On the southern and western sides of the town there are numerous date groves, on which much care is apparently bestowed: streams of beautiful water intersect them in various directions. In many of the groves we observed maize and cotton growing, which, by their beautiful green tint, presented a delightful contrast to the sandy appearance of the soil. There is a very good bazaar, in which the principal articles sold are dates, bread, fish, poultry, and meat (chiefly mutton); together with cotton cloth, which they manufacture with a species of hand-loom.

This tribe is possessed of several horses, some of which we saw: they are of a small compact make. Most of them have nice Turkish saddles, and they ride without stirrups.

We received a very pressing invitation from Kallipheea ben Ali, Sheik of a Bedouin section of the tribe,—who had come here as mediator between the two tribes, on account of the ensuing month being Dulbajja,—that they might perform the pilgrimage &c. unmolested: when that time has

elapsed, the war will be renewed as before; but our time being limited, we could not accept the invitation, his territory being three days' journey distant.

A slight incident occurred during the first day of our visit, which will serve in some measure to display the curiosity of the Arabs. We had signified our wish to enjoy the luxury of a bath after our journey, and were conducted to a small stream outside the town. Such was the curiosity of the people that they crowded the walls overlooking the stream, to such an extent, that, on our leaving the water to dress, one of the mud banks more laden than the rest, unable to sustain the weight imposed on it, gave way, and the fragments, together with a fat Arab, rolling in the direction where we were standing, completely buried our clothes, and we only escaped the same fate by jumping again into the stream. The natives appeared much concerned at our misfortune, and immediately assisted in removing the mud and stones, and recovering our effects.

After staying with the Beni-boo-Hassan tribe two days, we left to pay a visit to the Beni-boo-Ali tribe, from whom an invitation had been sent the day previous. We were accompanied by the Sheik, and four of his tribe, on horseback, as far as the boundary of his territory, which is indicated by a mud fort erected close to the road or camel-track: at this part a quantity of wells were being dug. The road for some distance lay, before reaching the Beni-boo-Ali territory, through thick date groves interspersed with streams of delightfully clear water, and neatly fenced in. The distance between the two towns does not exceed six or seven miles.

This town presented a very different appearance to that we had just left, the houses being more scattered, and many, which had originally been much superior to the present ones, partially knocked down, which they informed us had been dismantled by the British troops in 1821.

The Ameer, Mahomed bin Ali, received us very cordially, and, on entering his house, or rather mud hut, which was very imperfectly covered with mats, entertained us with coffee, &c. He is a man of very venerable appearance, about 70 years of age, and appears to be very much respected by his people. He showed us the letter he had received from the Bombay Government, by the *Palinurus*, and was apparently much surprised when we told him we had not brought any other for him, and were on no political mission whatever.

There is a mud wall being built round the town, but they are not at present proceeding with it. We were shewn the ground (which is just

without the walls,) where the action was fought between the British troops and themselves: there were one or two broken pieces of artillery still remaining, and in the Sheik's compound there are two entire pieces. The town is very thinly inhabited, and the people seem to have no occupation, as in the other town, where all was business: they also appear to be wretchedly poor in comparison with their neighbours. We did not find them nearly so curious as in the other town, but left us much more to ourselves. We visited the bazaar, but found it a very poor one.

On the morning of the third day we took leave of our entertainers, and commenced our journey to Roves, where the Ameer's eldest son (Hamed) was to meet us, it being his intention to visit the ship. Our route for the first few miles lay in a S.S.Wly. direction, passing several date groves: we then struck off to the westward, where nothing of any interest was presented to our view, it being a sandy desert, and here and there a stunted shrub. We halted for the night in Wadee Sahal, and resumed our journey before sunrise the next morning, travelling still in the same direction, and over the same sandy desert. At about 9 A. M. we arrived at Roves, a small fishing village composed of cadjan huts. On enquiry we found that the ship had not arrived, but was still to the northward. We met here a man who had acted as pilot to the *Palinurus* the year previous, who very kindly proffered his boat, but previously took us to his hut, (where we met the Ameer's son, who had arrived a few hours after us,) and regaled us with rice, fish, dates, &c. We then returned to the beach, and, after much delay and deliberation, the boat was launched. We embarked with Hamed and suit, and reached the ship at about 8 P. M., very much pleased with our journey, the natives throughout having been kind and attentive to us in the extreme.

(Signed.) C. G. WARD, *Acting Master.*
„ C. J. SYLVESTER, M. D., *Assistant-Surgeon.*
(True Copy.) A. MALET, *Chief Secretary.*

ART. IV.—*An account of an Overland Journey from Leskkairee to Meskat and the "Green Mountains" of Oman.* By Mr COLE, of the E. I. C. S. B. *Palinurus.*

[Presented by Government.]

ON the 22d of November, having obtained leave of absence to travel overland to Meskat, landed at the Village of Leshkairee in the Beni-boo-Ali territory. About a week previous, when off Roves, a small fishing town, I made an arrangement with one of the Bedouins in attendance on the Sheik of the Beni-boo-Ali's son, who was then on board the vessel, to

meet me at this place, and accordingly I found him on the beach in readiness to start. Our arrangements were soon completed, and in less than half an hour from landing, mounted behind my guide, as he had only provided one camel, commenced the journey by proceeding towards Jahlan, where we arrived at 9 A. M., and went direct to the Ameer's house. When about six miles from the town my guide was alarmed by the report of fire arms, expressing great fear that some foul play was going on, but after the lapse of about a quarter of an hour, a noise of an approaching party was heard. The guide was immediately with his head on the ground, and after listening for a few seconds, he jumped up and moved on merrily, pronouncing the approaching individuals to be friends: and shortly after we met, and learnt that the firing had proceeded from them. On entering the town, my guide, Akmar, having dismounted, the camel suddenly took fright at a stray bullock, and threw me. I was somewhat stunned at first, but fortunately not injured. The Bedouin shewed the greatest solicitude, and it was some time before I could convince him that no damage was done. The distance from Leshkairee is about sixteen miles: the first part of the road was very broken and sandy, the latter generally level and more firm, with the usual tree of the desert, the Acacia, called by the natives "Gharf," but not at all plentiful. As soon as the sun was up next morning, I received several visitors, all those who had seen me last year expressing great delight at my paying them a second visit, and anxiously enquiring whether I would return again next year; to which I constantly replied with the usual answer, "Insh Allah." The old Ameer, I was sorry to observe, was much altered for the worse. He appears very infirm now, and is constantly ailing, and I was much surprised to find that the fortifications he was so intent on repairing last year, were entirely abandoned, being exactly in the same state as at that time. Immediately after the noonday meal, took leave of the old Ameer, and set out in company with five or six companions for the adjacent town of the Beni-boo-Hassan's, where I purposed passing the night with my friend Ali bin Salam, who received me so courteously on my first visit to this country.

2. Two of my companions belonged to the tribe of "Beni Rasim," whose chief town, "El Wafee," I had been informed was the most flourishing in the district of Jahlan. They invited me to visit them, which I promised to do, and then parted. Having arrived in the Beni-boo-Hassan town, I proceeded direct to Ali bin Salam's house: he was out at the time, but a hundred messengers were soon in search of him with the news of Salam's (my travelling name) arrival, and in a few minutes he made his appearance. All the town soon heard the report, and, as usual, an im-

mense crowd assembled—one fellow, a slave, looking as proud as a peacock in a white jacket, and trowsers, which had been given to him by my shipmates (Messrs. Sylvester, Ward, and James,) when here. Many enquiries were made after these gentlemen, and all were greatly chagrined to find that they had actually been visited by an English doctor without their knowing it. This ignorance was extremely fortunate for the gentleman concerned (Dr. Sylvester,) for had his character been once known, the whole population would have besieged him with an account of all sorts of imaginary diseases. Here I obtained a second guide, a man of the Hanaweger tribe, my other being a Junebi of the Beni Gharferee branch, —individuals of these tribes forming a mutual protection for each other in any part of Oman.

3. At 10 A. M. next morning took leave of Ali bin Salam, and started for "El Wafee," two hours' travel (five or six miles) bringing me to that place, and was kindly received by a young man (Abdalla bin Ali,) a cousin of the Sheik who was then absent. "El Wafee" is a walled town, —the houses larger and of a more respectable appearance, than those in the Beni Hassan country, but not so numerous. Lime trees are very plentiful; oranges, plantains, pomegranates, tamarinds, olives, and grapes, in moderate quantities; together with the usual articles, viz. git and mysably, being a kind of grass given to cattle, and dokhan, which produces a very small seed used for making bread. Barley and a little cotton is also grown, but no wheat. The Beni Rasim is not a very large tribe, amounting to no more than five hundred warriors, who are mostly armed with the matchlock, while some only carry spears, but the "jambeah" is universally worn. I found them busily engaged constructing a wall to protect their date groves from the Beni Hassan, a powerful tribe residing principally in the range of mountains above "Soor," with whom they were then at war. The rate of pay for labourers employed on this work was at the rate of one dollar for every twenty-four feet in length, the height being ten feet, and two in breadth.

4. At sunset took leave of my kind entertainer, and after two hours' travelling reached "Felaij el Maskayekh," a small Bedouin place, consisting simply of a date grove with a few miserable huts. The whole of the road from "El Wafee" was thickly covered with the Gharf tree of a much larger size than any I had hitherto seen.

5. The family of one of my guides lived here, and having expressed a wish for a drink of milk, I was nearly suffocated with the great quantities which their ideas of hospitality compelled me to swallow. Slept in the open

air, and next morning my blanket was completely drenched from the excessively heavy dew that had fallen during the night. I was anxious to make an early start to-day, as Bedeyer, my next station, the natives called a day's journey; I therefore concluded it to be distant about twenty-five miles: but with all my endeavours, it was noon before I could prevail on my guide to take leave of his family. Our road now was over a complete desert, a few bushes, and those very parched, only meeting the eye. From having set out so late, night closed in long before reaching Bedeyer, and my guides pretended to be very apprehensive, constantly stopping and looking anxiously around, and enjoining the strictest silence for fear of attracting any passing marauders: this however I felt pretty confident was merely assumed to enhance their services. As they were continually endeavouring to impress upon me the great dangers of the road, my constant reply was, that "having no feuds with the people of the country, none of them would molest an Englishman." This opinion, some time after, when they found that I was not to be imposed upon by such idle reports, they fully concurred in, admitting that in no part of Oman was there the slightest danger,—that on the contrary, wherever I went, every attention would be paid me, particularly as I was a "Serkali"—a term almost as generally understood in these parts as in India. At 8 P. M. arrived at Bedeyer, having travelled a good twenty-five miles. Passed the night in a small hut. The first thing next morning I was conducted to a silversmith's shop, where I found a numerous circle, who all rose to receive me, and coffee was immediately served round. My entertainer the silversmith was a very respectable-looking man, and had never seen an Englishman since our troops were at Jahlan. All present were very cleanly dressed.

6. Bedeyer is not a regular built town, but comprises some eight or nine date groves, which have sprung up around so many different springs: they are all separate, some three and four miles apart, the intermediate spaces sandy and barren, and the whole are situated in one large plain; the Soor mountains to the Nd. and Ed., with a range of sand-hills to the Sd. and Wd., beyond which all is desert.

7. This is the place from whence the dry date eaten in India is exported: it is the most valuable description grown, and is called mybsalee. Caravans of five and six hundred camels, laden solely with this article, leave daily for Soor in the date season, from whence they are mostly shipped for India. This trade renders Bedeyer the most wealthy place in Oman, Meskat excepted: the dates grown elsewhere being of a less valuable quality, are entirely used for home consumption. A single date tree of the mybsalee kind is worth on the average from ten to fifteen

dollars, whereas the various other descriptions never exceed five. There is not a single respectable house to be seen: the only thing like a building is a large fort with five towers, standing in the principal plantation, and inside of which is the market. The inhabitants are of the tribe of El Haiyarien, but have far more of the townspeople in their appearance than that of the Bedouin. There are several Sheiks, but none possessing any particular authority. This being the month of the pilgrimage, everything is gaiety, the principal amusements being horse and camel races; and the whole population, dressed in their best, are strolling about from morning till eve. The women, who do not cover their faces, and are not at all good looking, generally wear a profusion of silver ornaments,—the ears in particular, which are perforated in numerous places, being completely studded with large rings: the weight is supported by a cord passed through the whole and tied over the head. A large ring round the neck, with dollars pendant, is universally worn. All eyes were of course directed on me, but more especially on the part of the ladies, who collected round me in crowds, and I was not a little surprised at their strain of conversation. The most indecent questions were put to me, and the whiteness of my skin greatly astonished them,—one woman exposing my breast, to the admiration of her surrounding friends, comparing her own with it: the colour of my hair, red, was also a matter of great curiosity, and when I asserted it to be the natural colour, the exclamations of surprise by the fair sex were unbounded.

8. On the second day of my stay here, observed a large cavalcade entering the open space in front of the fort, where the races were going on, and immediately recognised one of the party to be "Said bin Abdalla," cousin to the Sheik of Soor, who I had met at that place a short time previous. I then learnt that this was the escort of the Sheik of the "Al Wahabies," (Khalifeen bin Ali,) who was en route to his own country from Soor, where he had been on a visit to the Sheik Mahomed. His arrival was extremely opportune, as I was anxious to pay him a visit (my shipmates having met him at Jahlan, and been much pressed to accompany him home, which circumstances prevented), while my guides were as desirous to avoid it, representing that part of the country to be extremely dangerous for strangers. Meeting the Sheik himself, therefore, was very fortunate, the matter being settled by my joining his party; and accordingly at 4-30 P. M. that day, riding by the side of the Sheik at the head of some forty of his followers, set out from Bedeyer and travelled till about 8 P. M., when we encamped in a small valley thickly covered with the gharf tree, for the night. A large fire was soon enlivening our

bivouac. A sheep purchased from some Bedouins living in the valley, was slain, cooked, and devoured in less than an hour: the method of cooking was by spreading the flesh on large stones previously heated in the fire. It was extremely good, and as I had tasted nothing since the morning, I might have competed with my wild companions in doing justice to it, but unfortunately there was nothing to take with it—not even a bit of salt. Before sunrise next morning we resumed our journey, and at noon halted at a small date grove, from whence the Sheik's house is distant about one mile. The first hour or two after our arrival was wholly taken up in receiving and returning salutations, every soul apparently in the place flocking towards us; and as on the approach of every new comer all present arose and remained standing till he had saluted every one of our party, I was never more pleased in my life than when a slave desired me to follow him for the purpose of taking some refreshment. I was greatly surprised to observe that even a slave on his approach to salute the Sheik, was treated with the same respect by the company rising to receive him: the slaves, however, invariably kissed the Sheik's hand, and most of them made the motion of doing so to all of us. At sunset set out for the Sheik's residence, which we soon reached, and found it a mere hut erected under the shelter of a tree. Carpets were immediately spread under some adjoining trees for the accommodation of myself, Said bin Abdalla, and our attendants, and supper served up. The Sheik did not join us, as it is not the custom for the host to do so, but made his appearance with the coffee when the edibles were removed, and remained till near midnight. In the morning, when about two miles from the date grove where we halted for the day, met a party of three Arabs and with them a slave. Some conversation took place, when I observed the Sheik order one of his followers (a nephew) to dismount and give his camel to the slave, who returned in our company, as also his companions, the three Bedouins. From observing no signs of anger at the time, I fancied they were a party purposely come out to meet the Sheik: I was therefore greatly surprised to learn, in the course of conversation, that these men had kidnapped the slave from a neighbouring tribe, and when met were on their way to Bedeyer to sell him. One of the thieves was present when the Sheik told me this, and instead of shewing the slightest annoyance at having failed in his design (the slave was to be returned,) he was one of the loudest in the laugh raised at my expense when I explained how theft was punished in my country. The slave trade was likewise discussed, and the utmost astonishment was expressed at the efforts of the English to put it down, observing that it was an indisputable fact that "negroes were especially created to be the servants of the white man."

The Al Wahabies are a powerful tribe, nearly as numerous as the Junelie, numbering about one thousand warriors, most of whom are armed with the matchlock. Their principal wealth consists in camels, possessing more than any other tribe in Oman with the exception of the El Awakman, the most powerful tribe in this part of the country, and who entirely live in the desert, subsisting on their flocks of goats, as they do not possess one single date grove. On the 30th of November, being the third day of my stay with the Al Wahabies, resumed my journey, and after three or four hours travel reached the town of Senow in company with Khalifeen bin Ali, who was about paying a visit to Meskat, where he repairs twice a year to receive "Buksheesh" from the Emaum. "Senow," a small town belonging to the Al Wahabies, and distant about nine miles from the residence of the Sheik, is situated on a hill with date groves stretching beneath. The houses, two stories high, and built of mud, are tolerably respectable; and the inhabitants number from three to four hundred. A little before midnight set out from Senow, still in company with Khalifeen bin Ali, and continued at a quick trot till 1.30 A. M., when we encamped in a small valley sheltered by the acacia, having travelled about eleven miles. Next morning I was surprised to find the valley completely crowded with men and camels, upwards of a hundred men having assembled during the night to follow the Sheik to Meskat, as none on such an occasion come away empty-handed. I was greatly pleased with the scene thus presented, as, from the morning being chilly, fires were kindled in every direction, surrounded by different parties, who, as the sun rose, approached our fire to salute their Chief. So great a number, however, was anything but pleasing to that personage, who only desired some twenty followers to accompany him; I was therefore not at all surprised, on arriving at Meskat, to hear that he had returned to his own country on the plea of being unwell, this being the only means of ridding himself of the incumbrance, for had he expressed any open disapprobation, a quarrel in all probability would have ensued as to who should be the lucky individuals to form the escort. The hint, I was informed by some of the tribe, will have the desired effect, and after a few days' delay the Sheik will be enabled to resume his journey with whatever number of attendants he may please to take. At 9 A. M. Khalifeen and the whole party resumed their journey, when we parted company, as his rate of travelling was by far too rapid and fatiguing for me. They have to make a wide circuit, in consequence of being at war with the people who occupy the direct route, which is no more than eighty miles, whereas the "Al Wahabies" will have to traverse at least twice that distance. Being very stiff from last night's journey, my progress to-day was very

slow. Passed several small date groves, but all so very poor that we could not procure a little grass for our camels: two of them were entirely destroyed, the trees being all dead from the spring in their vicinity having dried up. At 4-30 P. M. reached "Minnik," where I was kindly received by the Governor of the place, who immediately conducted me to a house,—the same that Lieutenant Wellstead occupied during his stay here. The distance travelled from the encampment of last night was about sixteen miles: the first part of the road had a range of hills on either side, and the latter environed by detached hills. "Minnik" is a walled town with narrow streets. The houses, two stories high, are built of mud and stone. The population is from four to five hundred: in Wellstead's time, (of whom particular enquiries were made) it exceeded double that number. This place has suffered more than any hitherto seen from the want of rain; no less than seven out of the eight springs with which the town was supplied are now quite dry, and, in consequence, large tracts of once cultivated land in the vicinity now lay perfectly waste, and whole date groves are entirely destroyed. The only flourishing plantation at present is to the N. and Ed. of the town: it is walled in, and formed into regular roads, the largest leading from the N. Eastern gate, being about five or six hundred yards in length. Here I saw a little sugar-cane growing: at one time great quantities were produced, for the manufacture of sugar, which they clarified with eggs.

9. On the second day of December, a little after noon, set out for "Nuswee," distant six or seven miles, the surrounding country being very hilly: passed several date plantations, many of them ruined and deserted. At 3-30 P. M. reached the town, and proceeded direct to the fort, where I found the Governor and several of the principal inhabitants, dressed quite gaily, making my appearance, which was anything but clean, still more conspicuous. I was received very kindly by the Governor, Seafe bin Ahmar, an old gentleman with a very pleasing appearance; and an apartment just outside the fort, where he resided, was immediately prepared for my accommodation. Shortly after my arrival a large party, all armed, and preceded by drums and horns creating a most discordant noise, approached the fort, when those present with the Governor joined them, and invited me to do the same. The whole party then formed into procession, the drums and horns leading the way, headed by a man who was continually crying out "a cheer for the Imaum, a cheer for his son, a cheer for the Englishman." This was responded to by the whole multitude yelling with all their might, until arriving at the grand square, when a circle was formed, and sham fights with the spear, sword, and matchlock,

took place. The tops of the houses on either side were crowded with well-dressed women with faces uncovered, but I certainly did not observe more than half a dozen pretty ones amongst the whole of them. The fight continued for about a quarter of an hour, when the party moved on to the middle of the square and commenced again. A third movement was then made, bringing us to the end, where we remained till a gun was fired from the fort, which is situated at one extremity of the square, and at the other extreme are two small towers, placed one on either side; when the word was given to face about, and we returned exactly in the same manner as in the advance, the ceremony having occupied nearly two hours. It is observed every year, at the conclusion of the pilgrimage, and continued for three days, during which time the market is closed, and business of every kind suspended. After the evening meal, the Governor, accompanied by half a dozen friends, came up to my quarters, when the old gentleman enquired if I was fond of singing; and being answered in the affirmative, he immediately dispatched a messenger to summon the "Bard of Nuswee," who he assured me had frequently performed in the presence of the Imaum's son, Said Khwainee, Governor of Meskat. The individual in question soon made his appearance, and after being regaled with coffee, commenced in true Arab style. He was rapturously applauded by the company, with the exception of my guides, who complained of not understanding a word he said: the performance, however, was tolerable, but by no means to be compared with the public singers at Cairo.

10. Nuswee, the largest town in Oman (Meskat excepted,) is situated about five miles from the base of the Green Mountains, and is entirely surrounded by hills: the heat in consequence is far greater than in other towns of the province, which are generally in more open situations. The town is built with regularity: the houses two stories high (stone) and of a respectable appearance, with narrow streets. The fort, which is round and built of stone, is about eighty feet high. I was not allowed to enter it, the Governor having orders to admit no stranger without an order from Meskat. I only saw two or three old rusty guns projecting from the embrasures. Date groves extend in every direction, but, as at Minnik, several are withered up, and a great deal of land laying waste for want of water.

11. The drought has continued now for five years, and it is feared that, unless a change speedily takes place, the whole province will be ruined. Notwithstanding all the philosophy of the Mahomedan character, the

greatest anxiety prevails throughout all classes, and I was continually applied to to know if any rain was to fall this year. The population at present does not exceed three thousand, as many families, from the ruin of their property, have been compelled to leave, generally repairing to the towns on the sea coast. It contains, I was credibly informed, nearly three hundred mosques: none of them, however, are of any considerable size—on the contrary, the majority are very small, and all built of mud, and, as they have no spires, the appearance of these buildings is very mean. The market is small but neat, and covered in: its length is about seventy-four paces, and twenty-five broad, containing four rows of shops, one on either side, with a centre building of two more. Copper vessels are manufactured here; and Nuswee was once celebrated for its sweetmeats, but none good are procurable now, from most of the confectioners having left. At noon on the third day of my stay here, set out for the Green Mountains, and a two hours' ride brought me to the small town of Tenoof, distant six or seven miles from Nuswee. This is a pretty little place, surrounded by a wall pierced with loopholes, and a castle stands at the eastern extreme, with a fine flourishing date grove to the westward. The houses, built of mud and stone, are small, and the population about three hundred. I had been given to understand that this town was actually in the mountains, but I now found its position to be immediately at the base of them. The Sheik received me very kindly, and undertook to provide me with a donkey and guide for the ascent; and at 7 o'clock next morning, having sent my camel back to Nuswee, I was again in the saddle. In five hours I reached the summit. The ascent was very steep, and the road dreadfully bad, being covered with large loose stones, so that at times I was quite at a loss how to proceed, as I could not discern the vestige of a path,—but not so the donkey, for, after taking a little rest, he would start on again, and carry me over places that I should have thought impracticable for any beast of burden. We sat down for an hour or two here, my guide being rather fagged, and then proceeded by going down a very deep descent on foot, after which the road led over a continued succession of ridges, but none too steep for riding,—four hours' travel bringing us to the first inhabited valley (Waddy bin Abeeb,) where I passed the night. This valley is narrow and precipitous, in most places not more than thirty yards across. The houses are small, and stand on one side about half way down, and both sides of the valley are laid out in terraces rising one above the other, where most of the cultivation is carried on, consisting almost entirely of fruit trees, viz. pomegranates, figs, peaches, apricots, walnuts, and sweet limes: the pomegranates are very

plentiful, and a little wheat and barley is also grown; while the hills on either side are completely covered with the vine. About noon set out for another valley, (Waddy Seek,) distant about four miles. This valley is much larger than bin Abeeb, and not at all precipitous, the approach to it on either side being by a gentle descent. The same fruit trees abound here as at the former valley, with the addition of the mulberry, which is very much prized by the natives. This was the limit of my excursion, as only five days remained to the expiration of my leave. At 10 A. M., therefore, on the 7th of December, commenced retracing my steps, and by 8 P. M. was once more partaking of the hospitality of the Sheik of Tenoof. I found the descent far more fatiguing than the ascent, and had I not been barefooted, (my shoes having been cut to pieces during my short stay in the mountains,) I would never have ventured on riding, for one false step would have been destruction to both rider and donkey.

12. The Green Mountains of Oman are merely a small part of the great range that traverse throughout this part of Arabia. The whole of the cultivated valleys might easily be seen in a couple of days, and their appearance is very tame, the hills being quite bare, and no trees of any size to be seen, with the exception of the walnut, which is cultivated with the other fruit trees in the valley. I was received everywhere with the greatest kindness, and here again frequent enquiries were made after Lieut. Wellstead. The inhabitants of these valleys indulge in wine of their own making; it is like the common black wine of Europe, only much inferior. Their excuse for doing so is on account of, as they consider it, the excessive cold of the mountains. I found it rather cold in the mornings about daybreak, but I do not think the thermometer could ever have been lower than seventy during the three nights of my stay here. I saw but few cattle, and altogether the natives appear to be exceedingly poor. Such a thing as coffee was not to be procured. At noon on the 8th of December, accompanied by two horsemen supplied by the Sheik as an escort, started on my return to Nuswee. At the moment of leaving the town a large party arrived, one of whom was the Sheik of a district about twenty miles distant: he pressed me very much to remain and accompany him home, and nothing would have afforded me greater pleasure, had I had time to do so, but as my leave expired on the 11th, I was obliged to decline. On nearing Nuswee my escort took leave, the Sheik of Tenoof being at variance with the Governor of that place. My guides were delighted to see me return on the day specified, as they were anxious to reach Meskat, for which place I desired them to be ready to start the next morning. Accordingly, at 8.15 A. M., accompanied by the

Governor and three of his friends, set out from Nuswee, and at 10.30 A. M. stopped at a small village (Fark) to breakfast, which was prepared in the mosque, when we again proceeded on our journey, and about two hours after reached a large village (Berkee) situated between hills, with a large building surrounded by a wall to the westward, and to the eastward a date grove, distant about ten miles from Nuswee: here we came to a halt, a carpet being spread under a tree for our accommodation. As this was the place where I was to part with my kind host, he insisted that I should spend the remainder of the day with him: it was therefore arranged, that, as I had no time to spare, my delay during the day should be made up by setting off immediately after the evening meal. The inhabitants of this village appeared to be in very good circumstances, and all were desirous that I should prolong my visit. A short time after sunset sat down to smoking dishes of rice and goat flesh, with liberal supplies of milk for drinking. I was placed by the side of the Governor, an extra dish of five wheaten cakes, soaked in ghee and sugar, being prepared for our particular gratification. Directly after coffee took leave of the worthy old Governor, who expressed great hopes of seeing me again: his friends, however, still accompanied me (one was his brother-in-law,) on account of the natives of this part of the country being very suspicious of strangers, particularly of Bedouins. Travelled till midnight, when we halted for the night at a travellers' bungalow in a village named Mettee. Most places in Oman have a building set apart solely for the use of travellers. On awaking the next morning found several of the inhabitants seated around a blazing fire with my companions, and soon after an excellent breakfast was provided by the Sheik of the village; after which the journey was again resumed, one hour and three quarters bringing us to a valley inhabited by the "Beni Ruwahi" and "Beni Yaber." At 11 A. M., one hour after entering the valley, alighted at the Sheik's house. Here my friends from Nuswee left me, a son of the Sheik's taking their place. After coffee, remounted, and at 4.45 P. M. reached "Sumaiyel," having travelled since the morning about twenty miles. This valley, known by the name of "Waddy Beni Ruwahie," is about fourteen miles in length, and generally very stony. The first part is narrow, but opens out gradually, with date groves throughout, protected by towers on the neighbouring hills on either side of the valley, and is in consequence considered almost unassailable by the Bedouins.

13. On arriving at Sumaiyel, took up my quarters in a large room just outside the principal fort, where the Governor (a Beloochee) resides. This I found to be a place of considerable extent, and the most flourish-

ing of any that I had seen in Oman. Water was plentiful; the date groves, which are very extensive, were in the best condition; and everything about looked green and healthy, forming a great contrast to the other parts of the country that I had passed through. The scenery, too, was far superior, the surrounding country being very hilly, with small fortifications on different heights; but all of them are in a sad state of dilapidation, and none possess any artillery, except the citadel, and that only boasted of two or three rust-eaten six pounders. Early the next morning left Sumaiyel. My guides were not at all pleased with the Beloochee Governor, because he had not furnished a very sumptuous supper the preceding evening, though, considering his means,—his pay not being more than twenty dollars a month,—I thought our entertainment very good. I was sorry to find that my guides on all occasions were very greedy, as, when anything superior, such as sweetmeats, was supplied us by the people through whose district we passed, they were not satisfied with what they eat at the time, but invariably, when an opportunity of doing so without detection offered, pocketed as much as they could, notwithstanding my remonstrances against such conduct. Throughout the day's journey the country was very hilly, with date groves here and there. A little before sunset put up for the night in a small village about nine miles from Meskat: this was the only place where the slightest inhospitality was shewn me during the journey, the natives declaring that they could neither give or sell us any kind of food—not so much as a little rice, or a cup of coffee, but were anxious that we should proceed, by declaring that there was a large village a little further on, where everything in abundance might be procured; but, in consequence of a fall from my camel in the afternoon, which had stunned me, I was in no condition to travel more that day, so that I was determined to abide here for the night. My guides did not approve of this resolution by any means, as they did not at all relish the idea of going to bed with empty stomachs. Being very much knocked up I soon fell asleep, and on awaking about two hours after, I was greatly surprised to find a goodly supper of rice and meat, with a large bowl of milk, placed before me. On enquiring how this came to pass, in a place where at first things had appeared so unfavorable, I learnt that my guides, hearing that a woman, whose husband was in Government employ at Meskat, resided in the village, repaired to her with the information that a sick "Ingleez" had arrived, and was very much in want of some refreshment, for which liberal payment would be given. The appeal was not in vain, for she set about preparing supper forthwith, but rejected all offers of money. For-

tunately I had some few things remaining from the presents supplied me on leaving the vessel, though none of any value, with which I was enabled to make some slight return for her extreme kindness. Before sunrise next morning, 12th December, mounted my camel for the last time, and at 9.30 A. M. reached Matrah, and was rather disappointed to find that the vessel had not yet arrived, as I had been informed, when at Sumaiyel, that she had arrived three days previously, which induced me to hurry on with all speed. At Matrah I immediately took boat for Meskat, where I was soon comfortably lodged in the Agent's house. Being much in want of clean linen, and having none of my own, I was glad to put on the flowing robes of the East till the arrival of the ship, five days after, enabled me to obtain a fresh supply of my own costume. The only animals I could learn of as inhabiting Oman, were the following, viz. a large animal the size of a bullock, with straight horns, and perfectly white, called Aboo Sota, and the Ibex, as also hares, gazelles, wolves, foxes, and leopards, the whole of which are eaten by the Bedouin. Rock salt is very plentiful, and likewise brimstone.

The natives of Oman do not smoke, and none of their mosques have spires,—in which they resemble the Wahabies, for whom, however, they have a great dislike, and are rather apprehensive that this sect will again become troublesome to their neighbours.

(Signed.) C. S. D. COLE.
(True Copy.) A. MALET, *Chief Secretary.*

ART. V.—*Report from* R. N. C. HAMILTON, *Esq., Resident at Indore, of a trip down the Nerbudda from Mundlaisir to Baroche,* made by Lieutenant H. L. EVANS, of the 17th Regt. Bombay N. I., and Deputy Bheel Agent. *With sketches of the Sansadara, and of a proposed Road along the North Bank of the Nerbudda to Dauree,* by Lieut. R. N. KEATINGE, Assistant to the Superintendent of Nimar.

[Presented by Government.]

No. 1266 OF 1847.

From R. N. C. HAMILTON, *Esquire, Resident at Indore,*
To R. K. PRINGLE, *Esquire, Chief Secretary to Government of Bombay.*
DATED INDORE RESIDENCY, *24th August,* 1847.

SIR,—I have the honor to transmit, for submission to the Hon'ble the Governor-in-Council, the accompanying copy of a report of a trip

down the Nerbudda from Mundlaisir to Baroche, made by Lieutenant H. L. Evans, of the 17th Bombay Native Infantry, and Deputy Bheel Agent, under my orders.

2. Lieutenant Evans is the first officer who has, when the river is full, in the rainy season, or at any other time, examined the stream continuously from Mundlaisir to Baroche. His report is a simple and clear narrative of the impediments and difficulties which have to be overcome before the Nerbudda can be made available for the transport of merchandize and traffic.

3. Above Mundlaisir to Hoshungabad, a frontier military station in the Saugor territory, there are two places where the passage of boats is obstructed,—one at the falls at Mundhar, and the other at Dharee. Annexed is a report from Lieutenant Keatinge, Bombay Artillery, Assistant at Nimar, of the River from the Dharee falls to Mundlaisir, which he has just visited, so that the information now submitted is, in fact, from the Dharee falls to the sea.

4. Above the Dharee falls to Chandghur, 12 miles, the natives informed Lieutenant Keatinge that the river was navigable and open.

5. Lieutenant Keatinge thus describes the river :—

"Para. 5. On the upper and eastern side of the falls of Dharee, the rock slopes into the river at an angle of from one to two degrees, and is so smooth and level that in most places a cart could even now be drawn over it. Below the falls, the rock ends in abrupt and irregular steeps of from ten to fifty feet, and during the three days I spent at Dharee I looked in vain for a slope to the water's edge.

"6. Within half a mile of the village there is a perpendicular rock 51 feet high, under which boats could come at all seasons, and if a crane were placed on the top of it, goods of every description, and even light boats, could, without the least difficulty, be drawn up and let down. From thence to the navigable part of the river above the falls, is only a distance of 1,490 yards, which could be made fit for carts, at the cost of 4 or 500 Rupees."

6. It is clear, from this report, that boats cannot be got over the Dharee falls, but from their foot Lieutenant Keatinge came in a boat with six boatmen, about the same number of attendants, and a good load of baggage, to Ooncar Mundatta, a distance of 20 miles, in five

hours, without meeting any obstacle or delay,—that is, from noon till 5 P.M. of the 3rd August. From Ooncar, Lieutenant Keatinge continued his voyage on the 4th to Mundlaisir, where he arrived in eleven hours without any sort of difficulty or impediment (except from an adverse wind), the distance being 30 miles.

7. Lieutenant Keatinge made also the trip from the Dharee falls to Mundlaisir in March 1846, the river being open at that season, though the stream was then very shallow.

8. On the 22nd July, Lieutenant Evans left Mundlaisir, and reached Chiculda on the 24th, a distance of about 60 miles. At the Sahesdareh falls was the first obstruction, but this was avoided without material delay or difficulty, the boats going by the middle channel.

9. Lieutenant Evans left Chiculda on the 25th, and reached the Hirn Phal, about 16 or 17 miles by, noon of that day, without meeting with any sort of obstruction. At the Hirn Phal the river had risen 18 feet above the hot season water mark, and Lieutenant Evans experienced very little inconvenience in descending this rapid, but a mile beyond, at Boorkhairee, is the chief obstacle : the boats, however, were got down the southern channel with some difficulty. Two miles further on, is the Gunnoee Ghaut, another rapid similar to the Boorkhairee : the fall, however, is inconsiderable, and the bed of the channel could easily be cleared and improved from hence to Beytala, 20 miles, (a Bheelala village four miles below the Hutnee river) : the passage is clear and deep, and no difficulties were encountered.

10. At Beytala is an obstruction very much resembling the Sahesdareh falls, which Lieutenant Evans passed by easing his boats down, guiding them by ropes. Half a mile below Beytala is a very bad rapid, which was cleared by a channel under the north bank, down which the boats were tracked. The river hence is deeper, very rapid, and free from material obstructions, and so to Haump, 25 miles from Beytala. Here the river narrows, and about two miles below Haump, commences a series of rapids known as the " Bala Gori," which continue for four miles. The river, being much confined, rushes rapidly between high rocks, through which, with ordinary care, a large boat can be navigated. Lieutenant Evans' raft of canoes here got swamped, the waves washing over and into the canoes, whilst the large flat-bottomed boat passed without trouble.

11. Hence to Soolpan, 25 miles from Haump, there is no difficulty. Six miles below Soolpan, the Mookree falls are encountered : the river

at its ordinary height in the rains (25 feet above hot weather mark) covers the rapids, and the passage is safe. The boat shot them with little trouble: the fall, however, when the river is low, is from 8 to 10 feet, but, as at the Sahesdareh, there is a backwater passage always available. At Mookree the hills end, and thence to Tullukwarra, about 20 miles, the river is navigable and easy.

12. From Tullukwarra to Baroche boats of large size are constantly passing.

13. From the foregoing, it is evident that Lieutenant Evans' trip has established, that a laden boat of moderate tonnage can be floated from the Dharee falls above Mundlaisir to the sea, without any considerable risk, during the rainy season when the Nerbudda is full; and that a boat could not be brought up the whole distance against the stream from the sea at that season, owing to the rapidity of the current.

14. If, then, the Coal, such as was sent by me to Bombay last May, and which is found in the Satpoora range of hills on the left bank of the Nerbudda, can be brought to the river bank at Dharee, or perhaps above, it may be floated to Baroche on boats to be constructed of the wood which is abundant in that neighbourhood, which boats may, at the commencement of the experiment, be disposed of to advantage after they have delivered their cargoes, or may return laden to Haump, to which place goods are now brought at certain seasons by water.

15. It is my intention, in January next, when the jungles are safe, to proceed, in company with Lieutenant Evans, from Chandghur to the Coal fields, and by personal enquiry to satisfy myself as to their precise locality, their distance from the nearest point of the Nerbudda, their probable extent, the cost of digging a certain quantity, and the expense of transporting it to the river and to Baroche; and, if possible, to make arrangements for the dispatch of a boat-load or more next season, that the experiment may be fully tested,—it being of the first importance that Bombay should, if possible, be independent of foreign supply for coal for its sea-going steamers.

16. In respect to Lieutenant Evans' observations as to the means for making the Nerbudda available to commerce, I have great doubts whether the returns would compensate for the outlay. The formation of roadways to transport the freight of boats at the different falls, may be undertaken, but they alone will not suffice; there must be a line

of boats to carry on the goods which may be sent, and an unity of working, which only could be secured by a River Company, or by a Government establishment.

17. If the transport of coal should answer, doubtless improvements will follow, and other produce could be carried: the subject is one of great interest, and shall receive every attention from me. Meanwhile, I hope the enterprize of Lieutenant Evans will be deemed such as to merit the approbation of the Governor-in-Council, for it was attended with much personal risk and exposure, all of which Lieutenant Evans voluntarily incurred to establish the fact of the practicability of navigating the Nerbudda during the rainy season.

I have the honor to be, &c.,

(Signed) R. N. C. HAMILTON,

INDORE RESIDENCY, 24*th August*, 1847. *Resident.*

Report of a Voyage down the Nerbudda from Mundlaisir to Baroach, in the month of July, 1847.

I LEFT Mundlaisir on the morning of the 22nd July 1847, having two boats—one the common ferry-boat, flat-bottomed, wall-sided, about 30 feet long, 4½ broad, and 2½ high, requiring four men to manage, and capable of carrying six maunds pucka (2,880 lbs.); and the other consisting of three canoes lashed together, with a platform of bamboos upon them. This latter I took, having some doubt as to the possibility of getting a large boat down the Hirn Phal rapids, remembering what Captain Anderson had done (vide his report,) and intending, in case of extreme difficulty, to unlash the canoes and carry them round the rapids, launching them again below. The result, however, will show that the flat-bottomed are the boats of all calculated in all seasons for this navigation.

2. We reached Chiculdah on the 24th, a distance I suppose of nearly 60 miles; the only obstruction below Mundlaisir to this point, is the Sahesur Dharra.* This has been so well described by Captain Anderson, that I need not enlarge upon it. It can either be got over by a road along the southern bank, or by, as he proposes, deepening the

* The boats were let down by ropes attached to the helm, by a channel in the middle of the belt of rocks, the said channel being a rocky slope, in which the water was some two feet deep. In the fair weather, when the river is low, boats go by the backwater channel.

backwater: should the former, for reasons hereafter given, be preferred, the accompanying plan, drawn by Lieutenant Keatinge, of the Bombay Artillery, assistant at Mundlaisir, who has kindly levelled and surveyed this spot, will show the road proposed,—a distance of about 1,200 yards in all.

3. I left Chiculdah on the 25th, and reached the Hirn Phal at 12 of noon. This distance, about 16 or 17 miles by the map, is perfectly clear, and free of obstruction: Captain Anderson calls it 25 miles, but I think this is a misprint for 15. The river, when I reached the Hirn Phal, had risen about 18 feet above hot weather height. I had often before been at the place, and was therefore enabled to estimate the height with tolerable accuracy. Like Captain Anderson, I experienced very little difficulty in descending this rapid, for it is nothing more; but it is the Boorkherry rapid, one mile below, that offers the chief obstruction: this Captain Anderson mistakes for the Hirn Phal, whereas the first place goes under that name. The Boorkherry rapid I succeeded in getting my boats down with some difficulty by the southern channel, but a road, I am inclined to think, would be the best mode of overcoming this obstacle, as, when the river is low, the length of the rapid would increase the difficulty considerably. The immense height to which the river rises in the monsoon—sometimes 70 feet above hot weather height—would be a serious objection to a lock or locks; but on this point I am not competent to speak.

4. About two miles lower down, (or even less,) is another place, called the Gunnoee Ghaut, the features of which are precisely similar to the Boorkherry rapid. Here, however, the fall being inconsiderable, it would be necessary only to clear away the detached fragments of rock in the bed of the channel to render it perfectly passable. From hence to Beytala, 20 miles, a Bheelala village on the north bank, four miles below the Hutnee river, the river is clear and deep, and the voyage offered no difficulty.

5. The hills on either side, from Dhurmkai above the Hirn Phal, to Beytala, rise to a good height, and are covered with jungle—inhabitants very scanty. Dhurmkai is inhabited by a few Bheels, under Kaloo Singh Bheelala. On the north bank, 10 miles lower down, is the large Bheel hamlet of Dussana, the people of which were formerly notorious for their predatory habits, but they are now peaceable enough. 6 or 7 miles beyond this, about one mile inland from the mouth of the

Hutnee, is Kukrana, a Bheelala village in the Rajpoor district; and two miles lower down, on the south bank, is Bhadul, a Bheel village, the residence formerly of the notorious freebooter Bamun Naik, now held by his son, a peaceable reformed character.

6. To Kukrana, Captain Anderson penetrated, and it was the fear of Bamun Naik, then openly in arms, that caused his boatmen to refuse to advance.

7. At Beytala is an obstruction very much resembling the Sahesur Dharra. It is a belt of rocks stretching diagonally across the river: from the middle to the north bank the rocks are perpendicular, except in one narrow channel near the bank, but towards the south bank they are worn away, and I found little difficulty in letting my boats down, guiding them by ropes attached to the stern: there may, however, be more trouble in doing so in the dry season. When I passed, the river was fully 20 feet above hot weather mark.

8. Below this again is a very bad rapid, about half a mile from Beytala. I tracked my boats down near the northern bank; but am inclined to think that there is deeper water in the middle of the river, merely obstructed by some large rocks, which just showed their heads above water at the bottom of the rapid, and caused such a sheet of broken water that I dared not trust my boats within it.

9. From about five miles below this, the hills rise to a much greater height; scenery magnificent, and the river deep, very rapid, and free from material obstructions. Both banks are studded with Bheelala villages, but the jungle is very dense around their little patches of cultivation. The rocks forming the banks are high—in many parts almost perpendicular; the stream has a current of about six miles an hour. From Bhadul the southern bank is Akranee, a portion of Khandeish; and the northern from the Hutnee is Meetwar, a Bheelala Thakoorship.

10. To Haump, 25 miles, the features of the river are the same—lofty hills, scarped rocky banks, deep channel, here and there rapids of no consequence, and a strong current. Haump belongs to the Rajah of Oodeypoor, a feudatory I believe of the Guicowar, and is merely a temple, there being no village. Here the river narrows still more, and about two miles below commences a series of rapids, known as the "Bala Gori," of the difficulties of which I had heard

much. It continues about four miles. The river, much confined, rushes rapidly between high rocks; and with ordinary care in a large boat there is no danger. But with the raft, the waves washing in, filled the canoes and swamped them, and we had to swim for it; whereas the flat-bottomed boat passed without trouble: nevertheless it is a place would always require care; yet as it became known, I have little doubt it would be scarcely thought of.

11. As far as Soolpan, 27 miles from Haump, the river is as I have described it above. Six miles below Soolpan are the Mookree falls. These being always mentioned as nearly if not totally insurmountable, I examined carefully. The river at its ordinary rainy height, about 25 feet above hot weather mark, covers the rapids entirely, and we shot them with little trouble. But when the river is low, there is a fall of 8 or 10 feet. Now all the people spoke of the existence of a backwater, by which, as at the Suhesur Dharra, I can conceive no obstacle to boats passing either up or down: moreover, from my own enquiries, and as mentioned by Lieutenant Elwan, of the Honorable Company's Marine, (vide his report) it seems that small boats do actually now ascend and carry kupra kerana and salt to Haump, whence they return with timber. Lieutenant Elwan says that toonies drawing three feet water go up; but my informants only spoke of canoes which draw when loaded six inches. However, all whom I conversed with agreed that nothing exists to prevent large boats from going up to Mookree and the Hills, and there end the difficulties: from hence to Tullukwarra, about 20 miles, is plain sailing; and below that, boats of large size come up constantly.

12. On carefully considering the character of the river, I may, I think, venture an opinion, that it would take very little to render it navigable, in the following manner, although I should like to see it as well in the fair season, when it is low, so as to leave no room for doubt, as during my voyage it was swollen.

13. At the Suhesur Dharra, the Hirn Phal, and Mookree, perhaps also at the Beytala Ghaut, a road along the bank might be formed, for which the nature of the banks offers great facilities. There would be objections to the plan, chiefly on account of the trouble and delay of unloading and reloading above and below, but when the difference of expense between a road and locks is considered, I think the former will be considered preferable: moreover, by it the boatmen on the river would only have to work in their respective districts. The

Burwari, Mundlaisir, and Mhyshwar, men would work between the Suhesur Dharra and the Dharree falls (above Oonkar Maundata.) The Ackberpoor, Dhurrumpooree, and Chikuldah, men would carry on to the Hirn Phal. From thence, another stage (or two) would bring to Mookree, below which the Tullukwarra boatmen come into play. At present there are no regular boatmen between Hirn Phal and Mookree, (about 80 miles) the canoes that come up to Haump being brought by fishermen and others incompetent to manage a larger boat.

14. The map accompanying Mr. Shakspear's resume of reports upon the river, is generally speaking very accurate. There are a few inaccuracies between Hirn Phal and Haump, but of no consequence. I regret that when my canoes were swamped at the Balagori rapids, my papers containing the bearings of the river in that part were washed away.

15. I may add, that the difficulties to be surmounted seem to me to have been very much exaggerated. Such was also the opinion of my friend and brother officer Captain Anderson, and I feel great pleasure in having followed where he had led the way. He was the first to descend the Hirn Phal—it was when the river was low (in March); and he felt confident, as do I, that the obstructions below the Hutnee river, beyond which his boatmen's fears prevented his proceeding, were no more insurmountable, even at that season, than those above the Hirn Phal for instance, which until his time was considered perfectly impassable for even empty boats.

16. I have navigated the river above Mundlaisir for 60 miles to the Dharree falls; to which place it is perfectly passable, and boats constantly go up. At Dharree, a road would also be required. Above Dharree, the falls of Mundhar are spoken of as bad; but the report is by a native, and I have no doubt it is by no means worse than those below: indeed, the present Colonel Ousely, when formerly at Hossungabad, states that, from his enquiries, he is convinced that Mundhar can be cleared. We should then have communication from Hossungabad, near which the coal is found, to the sea. Coal, grain, linseed, and many other of the products of Central India, amongst which not the least considerable would be opium, would pass down; and from October, goods, cloth, spices, cocoanuts, and Europe articles, supplies could come up. The places where roads would be re-

quired would be as depots : the distance of porterage would be trifling ; and in the rains, the time when coal could be sent down, even that would be diminished.

1st	stage, Hossingabad to Dharree, about	100	miles.
2nd	do. Dharree to Suhesur Dharra,	70	„
3rd	do. Suhesur Dharra to Hirn Phal,	67	„
4th	do. Hirn Phal to Beytala Ghaut,*	20	„
5th	do. Beytala Ghaut to Mookree,	60	„
6th	do. Mookree to Baroach, about	80	„

17. I arrived at Baroach on the 1st August, having accomplished the whole distance from Mundlaisir in eleven days, during which I was 102½ hours actually under way. The distance between Dhurmkai above Hirn Phal, and Mookree, about 80 miles, occupied 21½ hours only, although spread over nearly five days.

18. The various reports referred to in this Memorandum—Colonel Ousely's, Captain Anderson's, and Lieutenant Elwan's—I have quoted from a resume made by Mr. Shakespear, Assistant Secretary to Government N. W. P., entitled "Notes on the Navigation of the Nerbudda," and which, with the map accompanying, require to be referred to to render this intelligible.

(Signed) H. L. Evans, *Deputy Bheel Agent.*

(True Copy) (Signed) W. F. Eden, *1st Assistant to the Resident.*

From Lieutenant R H. Keatinge, *Assistant to the Poll. Agent, Nimar,*

To Captain P. T. French, *Poll. Assistant in Nimar.*

Dated Mundlaisir, *6th August,* 1847.

Sir,—I have the honor to inform you that, according to your suggestions, I left Mundlaisir on the 29th of July, and proceeded towards Dauree, to see if a road could be made along either bank of the Nerbudda so as to circumvent the falls opposite that place.

2. Leaving Burwai on the 30th of July, I proceeded to Seylanee, a distance of 14 miles, by the road lately cleared. About six miles from Burwai the jungle becomes a forest, and continues so to Dauree, which is 18 miles from Seylanee.

* I am by no means certain that a road would be requisite at Beytala.

3. During the whole of the day, as I rode through the forest, I was surprised to see large and old timber left uncut within a mile of the river, but on enquiry was informed that it was impossible to transport any but the smallest-sized trees, even that short distance, owing to the absence of tolerably clear paths.

4. Bamboos, however, are cut in great numbers and brought to the falls, where the Gonds who carry them there exchange them for grain with speculators from Mundlaisir and Mehasur.

5. On the upper or Eastern side of the falls of Dauree, the rock slopes into the river at an angle of from one to two degrees, and is so smooth and level that in most places a cut could even now be driven over it; below the falls, however, the rock ends in abrupt and irregular steps, of from ten to fifty feet, and during the three days I spent at Dauree I looked in vain for a place where a road could be made without considerable expense to slope down to the water's edge.

6. Within half a mile of the village there is a perpendicular rock, fifty-one feet high, under which boats could come at all seasons, and if a crane were placed on the top of it, goods of every description, and even light boats, could, without the least difficulty, be drawn up and let down. From thence to the navigable part of the river above the falls, is only a distance of 1,490 yards, which could be made fit for carts at the cost of 4 or 500 Rupees.

7. Timber, both large and of good description (ungun,) grows on the spot, so that no difficulty exists to large and powerful (though doubtless rough) cranes and windlasses being constructed on the very rock where they are to be used.

8. Many of those who now go up the Nerbudda for the purpose of buying or cutting wood, leave their boats at Dauree, whilst others with great labor drag them (if light enough) over the rocks. But for this, many men are required: all these are of the poorest of these poor provinces, and unaided, will never be able to afford the expense of in any way surmounting the difficulties of the river at Dauree, but I feel convinced that were such a measure undertaken, we should see a trade spring up between this and the Hosungabad Provinces.

9. Several natives with whom I conversed, had been up the river as far as Chund Ghur, the site of the great Iron mines, twelve coss above Dauree, and report the stream quite as clear as below.

10. On the 3rd of August, at twelve o'clock, I left Dauree in a boat with six boatmen, about the same number of attendants, and a good load of baggage, and arrived at Ooncar, a distance of twenty miles, at 5 P. M., without meeting any obstacle or delay.

11. On the 4th of August, I left Ooncar at five A. M., and arrived at Mundlaisir (thirty miles) at six P. M., having stopped an hour on the way. Our progress this day was much impeded by a smart westerly wind, but the river presented no sort of difficulty.

12. During the rains of 1845 I went by the river from Mundlaisir to Ooncar, and back; and in March 1846, I proceeded from Ooncar to Dauree and back again, the stream being at that time very low; but on neither occasion did I meet with any obstruction.

I have &c., (Signed) R. H. KEATINGE, *Lieutenant,*
Assistant to the Political Assistant in Nimar.

P.S.—I have the honor to enclose a Section of the proposed Road along the Northern bank of the river at the falls.

(True Copy) (Signed) W. F. EDEN, 1*st Assistant to the Resident.*
(True Copies) J. G. LUMSDEN, *Secretary to Government.*

Note on the Navigation of the River Nurbudda. By Mr A. SHAKESPEAR,
Assistant Secretary to Government N. W. P.

Importance of the subject.

THE benefit which would result from opening a direct communication from the sea into the heart of Central India, by means of the Nurbudda river, was acknowledged by Major-General Sir J. Malcolm as far back as 1820, and steps were taken by that officer for collecting the necessary information.

Since then, although no regular scientific enquiry has been instituted, yet Government has, from time to time, shewn itself alive to the importance of using the stream of the Nurbudda as a medium of communication, and making it an outlet for the produce of the neighbouring country.

Channel for the produce of the valley of the Nurbudda.

Upon its waters the products of the valley of the Nurbudda, rich in mineral and vegetable resources, would be borne to a market, and available for adding incalculably to the national wealth.

Making coal-beds available.

But it is only of late years, since extensive coal-beds have been discovered to exist within a short distance of its banks, and the value of the mineral to be there procured has been tested and established, that the still greater importance of this stream has been felt.

In the present day, when steam communication has become so extensive and so necessary, we cannot too deeply feel the importance of relying upon this country alone for the supply of coal required for its consumption. No coal has been found nearer to Bombay than that above alluded to in the Hosungabad district. All this supply therefore would be available for the western coast. The discovery of coal-beds at a nearer point than they are now, is so remote a contingency, that it can hardly be said to affect the present question.

The following compilation has been made with a view to exhibiting, in a concise form, all the authentic information which has been obtained up to the present time regarding this important river.

Information whence obtained.

The materials from which it has been drawn consist chiefly of official documents on the records of Government, extending from 1620 to the present time. An extract has, however, been appended from an interesting report, to be found in Appendix No. II. of Malcolm's Central India, on the Geology of that part of the country, furnished by Captain Dangerfield.

The map (reduced from one compiled in the Office of the Surveyor-General of India,) which will be found attached, shows the course of the river from Hosungabad to the sea. On it the principal obstacles to the navigation are noted.

The information how to be exhibited.

The amount of information already acquired may be best exhibited by dividing the whole length of the river, from Hosungabad to the sea, into three portions, and treating each separately.

1st.—From Hosungabad to Mundleysir.

2nd.—From Mundleysir to Tulluckwara, and

3d.—From Tulluckwara to Baroche.

1st Portion.

Hosungabad to Mundleysir.—The river taking its rise in Gondwarra, passes Hosungabad in a stream of about 900 yards broad, and is at this point distant about 318 miles in a direct line from the sea.

1st. Native Surveyor in 1833-34.

Between Hosungabad and Mundleysir our first information regarding the stream is derived from a report made by a native surveyor employed by Captain Ouseley, Principal Assistant to the Governor-General's Agent at Hosungabad.

This survey * was made in 1833-34, and from it Captain Ouseley considered that "the possibility of making the whole river navigable exists, but the expenses would be great, with the exception of Dhadroo, where a lock would be requisite, or portage if an uninterrupted navigation were adopted. There is no place from Behraghur near Jubbulpoor to the mouth of the river, that might not be rendered passable for such boats as are now used, thirty or forty feet long and eight or ten wide, flat bottoms. All the places in the sketch marked as rapids, could, with trifling expence, be rendered passable. Mundhar, twenty or twenty-five miles east of Dhadroo, is a fall of ten feet, but on one side a rapid only, and could be cleared. From Dowlutpoor to Oonkerjee, the sides are high rocks generally, and a contracted and very rapid current running among detached rocks and islets."

The rest of this portion he speaks of as wide and navigable. Regarding the fall of forty feet at Dhadroo, he considered, that even if this proved an insurmountable obstacle to a continued navigation, it might be made a place for unloading above and replacing the goods in other boats below the fall; a portage of half a mile only would be required.

It must be borne in mind, however, that these opinions were expressed upon the report of a native surveyor, who, although a man of apparent intelligence, could have had no experience, and very limited knowledge, of the means available for improving navigation. It does not appear, moreover, that he took any steps for ascertaining with accuracy the fall of the river, or making such observations as would afford grounds for deciding on the steps which would be necessary for overcoming the obstructions to be met with.

2nd. Lieut. Hore's experimental trial.

In 1840, in consequence of the repeated representations of Lieutenant Hore, Junior Assistant at Saugor, an experimental trial, † to transport coal by rafts from Hosungabad, was made on a small scale by Lieutenant Browne, Principal Assistant at Hosungabad.

* The original survey is not to be found on record. Capt. Ouseley appears only to have submitted the result of it with his opinions.

† Made between August and November, 1840.

In reporting, in November 1840, the total failure of the attempt, Capt. Browne writes as follows : " From Hosungabad to a distance of 20 or 25 miles below Hindea, the river is open during the rains ; but there, from the description of the person sent with the boat, a fall of a considerable height is met with, sufficient to stop the progress of any boat. Every inducement was held out to the boatmen to proceed further, but they flatly refused, and would not even permit their empty boat to advance without being insured the value of it."

" From enquiries made of the boatmen at Hindea, it seems that no boat has ever been known to pass this place, and it is considered by them an impossibility."

3rd. Capt. Abbott.

Captain J. Abbott, late Assistant in Nimar, whilst in charge of that district, " lost no opportunity of collecting, and noting down, all the information procurable from persons who had visited the principal obstacles." His own actual knowledge was limited to the boundaries of his district. From what this officer states in his observations upon the obstacles impeding the navigation of the river, submitted in March of the present year, it appears that from enquiries he had made, the river is navigable (except in the driest season, when it is spread over too wide a surface) from Hosungabad to within 20 miles of the Dhadree falls. That at Dhadree it is precipitated over a ledge of rocks forty feet in height, and for about 20 above this, navigation is impeded by rocks and rapids. The rest of this portion, *i. e.* from Dhadree to Mundleysir, is navigable the greater part of the year to vessels of light burden ; but during the very dry months, from the middle of March to the middle of June, the water at the rapids is too shallow to float the larger river craft.

IId Portion.

Regarding the second portion, viz., from Mundleysir to Tullackwara, we have fuller and more satisfactory information.

1st. Lieut. Mathias' journey in 1820.

As early as 1820, Major-General Sir J. Malcolm had contemplated opening a river communication with Baroche, and with this object several officers were deputed by him to survey the course of the stream. The following extract from a Journal of a Voyage made down from Mundleysir by Lieutenant V. Mathias, of the 6th Regiment N.I., gives us our first information respecting this portion of the river :—

" Left Mundleysir on the morning of the 26th March 1820, in an open boat called a punt, made out of a single tree, about 12 feet in length, 20 inches in breadth, and drawing 18 inches water, with myself, two boatmen, and a small quantity of baggage.

" From Mundleysir to the Hirun Phall, a distance of eighty (80) miles, there is an uninterrupted navigation for small boats from the commencement of the Monsoon till the end of April, and it is then only interrupted in one place,* three miles below Muheysir, where part of the river falls down a small precipice, and a back stream is there made use of for the boats. But during the last six weeks of the hot weather, from the shallowness of the water, and the boatmen neglecting to deepen the back stream as the water decreases, it of course becomes dry ; but should it ever be required to be made use of during those six weeks, I have no doubt, from the appearance of the river, that a little labor would make it navigable all the year round.

" From the nature of the rocky bed of the Nerbudda at the Hirun Phall, I conceive it impossible that the obstacles to navigate it could ever be surmounted, from the circumstance of small ridges of rocks running parallel to each other in the river, and only distant from 12 to 20 feet, it causes such a rush of water through them, that the boatmen are afraid to pass it, being unable to guide the boat clear of the rocks ; and one which I prevailed upon the men with some difficulty to make the attempt with, was upset, and the men much bruised against the rocks. But a still greater obstacle exists about a mile below that, where nearly the whole water of the river rushes into a channel not more than forty yards broad, attended

* Luheesvidara.

with a considerable fall, and with such violence, that any boat trying to pass it must inevitably be lost.

" Finding myself unable either to proceed along the bed of the river or in a boat, I determined upon getting down to Hamp Island, in the expectation that I should there be able to get boats and return by the river to the Hirun Phall, or, if not, proceed from thence to Barocho ; for which purpose I came back about three miles, and landed on the North bank of the river at the small village of Dhair, and proceeded nearly due North to Kooksee along a good cart road, distance ten miles and seven furlongs. From hence I marched in a North-west direction to Rajpoor, distance twenty-nine miles and one furlong—also a good cart road, but the last twenty miles is through a thick jungle. I then moved in a Southerly direction to Allie Mohun, through an open jungle, distance nine miles and five furlongs, till within two miles of the place, when it thickens to a deep jungle with small hills. From that to Moondlah, a distance of twelve miles in a South-west direction, through a deep moving country, in many places well cultivated by the Kressans, or Bhillala tribe, and thickly studded with large mowah trees. From this I went to Oomtee, in a Westerly direction, ten miles, through a beautiful cultivated country, thickly planted with the largest description of mowah trees ; and from hence to Hamp, in a South-east direction, by the Gore Ghaut, is ten miles and six furlongs, and is through a wild hilly and jungle country, cultivated in spots for the first five miles by the Kressans.

" Here I was much disappointed in finding myself unable to proceed in any direction, from the nature of the country and the rocky bed of the river ; and to add to my further disappointment, not a boat was to be procured, nor could I hear of one ever having been seen between the Hirun Phall and Mokree, except the punt, or small passage boat at this place, now useless from its decayed state. The bed of the river is here, when full, about two furlongs in breadth, with masses of large rocks in every direction, and the water at this time confined within a narrow deep channel from twenty to forty yards in breadth, as far as I could see from the highest hill in the neighbourhood ; and in one spot that I went to, the channel was not ten yards in width, the water rushing through it with a slight fall and tremendous force. Nothing now remained but to make my way to Mokree by the nearest route I could find ; but not being able to take my baggage through hills, I was obliged to go to Kewaunt in Guzerat, and only distant from the Gore Ghaut in a Northerly direction eight miles. From that I went to Barsnee, in a South-west direction, twenty-one miles and seven furlongs, through a highly cultivated country, thickly studded with mangoe, mowah, palmira, and other forest trees. From hence to Tulluckwara on the Nurbudda, in a South-west direction, is twenty miles and seven furlongs, through an open jungly country.

" Here I again embarked, and went up the river as far as Mokree, distance about twenty miles, and there found an insurmountable obstacle to navigation in a fall of the river which of itself is inconsiderable, but prevents the possibility of a boat ever passing it. I then returned to Tulluckwara, where I had left my baggage, from inability to take it with me from the hilly nature of the country."

2d. Major Wilson's journey.

In addition to this, and in order to establish the fact of the navigability between Mundleysir and Chiculdah beyond a doubt, Major Wilson, at Sir J. Malcolm's request,* went from the Hirun Phall to Mundleysir in the end of July 1820, " when the small quantity of rain that had fallen rendered the river uncommonly low for the season."

" The result † of the examination of this part of the river," Sir J. Malcolm writes, " was that, with the exception of the portage of Luheevidurrah, near Muheysir, where the river, from the fall, or rather rapid, is always very difficult, and sometimes dangerous, the navigation between Mundleysir and Chiculdah was practicable for light craft nine or ten months in the year."

* In a boat which Sir J. Malcolm mentions as " a large and rather heavy passage boat."

† We obtain our knowledge of the result of Major Wilson's trip, through Sir J. Malcolm ; no Journal by Major Wilson being on record.

Major Wilson also informed Sir J. Malcolm, that, from his enquiries, and from the meteorological observations he made whilst he was at Mundleysir, it appeared that the wind blew at this time of the year almost always from the West, increasing with the Monsoon, and enabling boats, when the current was at its height, to stem it, and to go in two or three, and sometimes in one day from Chiculdah to Muheysir.

He stated, that the river between Hirun Phall and Mundleysir was almost straight, and that this was a great advantage to the flat-bottomed boats, as they never had to shift sail in coming up. In going down, they were aided by the current, and resorted to punting where that was slack and the water shallow.

3d. Lieut Anderson's journey in 1842.

Lieutenant J. Anderson, of the 17th Regiment Bombay N. I., was appointed to survey the Nerbudda between Hindea and Hirun Phall in October 1841, but owing to the non-arrival of the necessary instruments, he was prevented from making any regular survey. When ordered to join his Regiment at Bombay, he resolved to proceed via Baroche in a canoe, "hoping to contribute somewhat to the scanty information already possessed regarding the very difficult portion of the river between Hirun Phall and Soolpan."

The following extract from his report gives the result of his observations as far down as Tulluckwara, with an account of the measures he was compelled to adopt when stopped in his further progress at the mouth of the Hutnee river:—

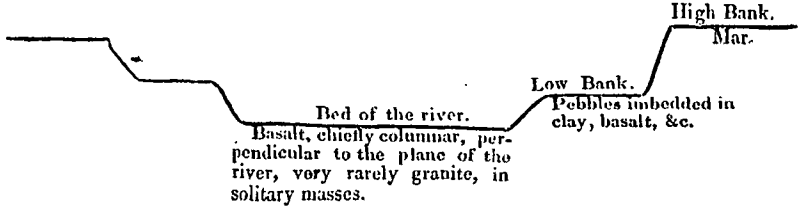
"I left Mundleysir on the morning of the 21st March 1842, in one of the ordinary passage boats used at the ferry: halted for the night at Kuttora, and arrived at Chiculdah on the evening of the 22d at sunset.

"This portion of the river, fifty-one miles in length, is navigable by boats lightly laden until nearly the end of the dry weather, with the exception of the rapids called Sahesur Durrah, which are about two miles below the town of Muheysir.

"This is rather a formidable obstruction, consisting of a belt of rock stretching diagonally across the river, and intersected by a great many narrow and tortuous channels, through which the water rushes with great impetuosity, until it is finally precipitated over a shelf about eight or ten feet in height into a sort of trough, at the extremity of which it again becomes navigable. Luckily, however, there is a back stream near the Southern bank, which affords a rather difficult passage for unladen boats until within about a month of the rains, but might easily be made practicable throughout the year by means hereafter explained.

"Between this and Chiculdah there are a few shallows and rapids, but I observed no obstacle particularly worthy of notice, and have no doubt that a comparatively trifling outlay would render this portion of the river available for boats much larger than that I sailed in for nearly, if not quite, the whole of the year.

"From Mundleysir to Chiculdah, the bed and banks of the river present every where nearly the same features, which may be exhibited by the following section:—


High Bank.
Mar.
Low Bank.
Pebbles imbedded in clay, basalt, &c.
Bed of the river.
Basalt, chiefly columnar, perpendicular to the plane of the river, very rarely granite, in solitary masses.

"I left Chiculdah on the morning of the 26th: passed Hirun Phall, slept on the bank of the stream nearly opposite to the village of Burkhery, and reached the mouth of the Hatnee next evening the 27th, where we spent the night on a rock in the centre of the river.

"Our progress was unimpeded for twenty-five miles below Chiculdah, the river having mostly the appearance above described, until we reached Dhurnarag, and (spelt Dhurmcote in the plan,) where it makes a bend to the South, and its aspect is totally changed. Here there is a gradual increase in the strength of the current, the rocks become larger and more numerous, and the stream, being somewhat contracted, is divided into several channels, through which it darts with considerable force.

"Although I experienced little difficulty in passing this rapid, and have ascertained that light boats may be taken up and down at this season without danger, if guided with ordinary care, it is nevertheless to be considered a serious obstruction to navigation, since, from the position of the rocks, it must be a dangerous spot when the river is swollen, and from its extent it would require a good deal of labour to make it generally available for traffic.

"This is one of those places which, on the score of expense, it might at first sight be thought advisable to avoid by means of a road; but a more accurate inspection than I had time to afford, would, I conceive, shew the possibility of overcoming even this obstacle at no very enormous cost, partly by clearing the channel, and perhaps partly by the mode recommended in my concluding remarks.

"Below this the river is deep, and continues so to the Hirun Phall, about a mile further down, where the greater part of it rushes through a channel only a few yards in width, with a force against which it would be useless to contend.

"The fall of this rapid is gradual, its channel varies little in breadth, and throughout its entire length, which is considerable, the water is broken into foam. But notwithstanding its formidable appearance, of which its length is the most discouraging feature, I am by no means inclined to regard it as so important as has been represented, its proximity to the bank, and the slope and position of the neighbouring rocks being particularly favourable for the construction of a road or locks, as might be found most convenient.

"I here left the large boat, as originally intended, having brought with me a canoe hollowed out of a single tree, and remarkably strong, in which I proposed to make the rest of the voyage. This we managed to get down with but trifling injury, not however until it had been repeatedly upset, and once or twice sunk, although I had a couple of strong ropes attached to it, and the assistance of five or six persons to guide it.

"I found expedient a road, apparently about a mile and a quarter in length, might be made on the northern side of the river, by which both this and the rapid above might be cut off; but owing to the unevenness of the banks its construction would be expensive, and it may reasonably be doubted if the saving obtained by adopting this plan in preference to others would counterbalance the disadvantages of a mixed communication. This question can be determined only by the most careful levelling, and a thorough and minute examination of the spot during the different phases of the river.

"Between this and Kukranuh, which is about sixteen miles below Hirun Phall, I met with only three interruptions, so exactly alike that one description will answer for all. At these places there is an abrupt descent of the river, and the channel becomes suddenly contracted, the stream rushing through with such violence that we were obliged to use every precaution in letting down the canoe. However, it luckily happens that in all of these the fall is inconsiderable, and the channel narrows only in that particular spot, so that, unlike the Hirun Phall, there being no length of rapid to overcome, the difficulty of making them navigable would be comparatively small.

"With these exceptions, I found the voyage both easy and pleasant, and it struck me that from Hirun Phall to Kukranuh, there were fewer shallows, and a greater portion of really navigable water, than in any portion of the river of the same length that I had met with above.

" At Dhurmraj, as before stated, the bed of the river is slightly contracted, but below it resumes nearly its ordinary width, the main body of the stream being in most places confined to a narrow channel somewhat resembling a canal. A little below Hirun Phall, the rocks rise on both sides in perpendicular walls, and the water is uncommonly deep, flowing for a long way with a gentle current, and without the slightest impediment. It is also worthy of remark, that in the spots already alluded to, where there are serious obstructions, the rock is but little elevated above the surface of the stream, and that for nearly the whole way from Hirun Phall to Kukranuh there is a low bank either on one side or the other, but generally on both, where a road might be constructed if necessary. The hills on either hand are pretty high, and covered with jungle.

" Kukranuh is a Bheelallee village in the Rajpoor territory, and situated on the Eastern bank of the Hatnee, about a mile from the Nurbudda.

" Here I was unfortunately compelled to abandon the idea of following the course of the river, the boatmen, from the reports they had heard of the unsettled state of the country, refusing to proceed any further without an escort to protect them. I accordingly remained at the village for three days, trying every expedient that I could think of; but although I offered a handsome reward, no one could be prevailed on to accompany me to Haump, so great was their dread of the Bheels. Finding therefore that nothing more could be done, and unwilling to incur censure by any further delay, I was forced reluctantly to make for Tulluckwara by land, intending to proceed thence by water to Baroche.

" On the 31st, I marched four coss North to Walpoor, a village belonging to Rajpoor Allee: reached Chucktollah on the 1st April, in a westerly direction eight coss, and Konah at five coss West on the 2d: on the 3d I proceeded to Barsnee, and arrived at Tulluckwara on the 4th.

" There is a garree track the whole way, having the appearance of being much used, which the natives told me was the case. In some parts it leads through a pretty thick jungle, and here and there it is hilly, but nowhere very steep, and, on the whole, it is as good a road as most of its kind.

" I was informed that there is a direct road from Walpoor to Chiculdah, and subsequently learnt that there is a shorter route from Kowant to Tulluckwara than by Barsnee; from which we may infer, that should my information prove correct, this would probably be the best line of road for establishing a land communication between Chiculdah and Tulluckwara. The distance from Kowant, through Barsnee to Tulluckwara, is about forty-one miles, and that from Walpoor to Chiculdah cannot, I think, exceed forty, so that, taking the shorter route from Kowant to Tulluckwara, and reckoning the koss at two miles, the entire length of road would be about one hundred miles; and Dhurmraj being fifty miles lower down, the distance might be still further reduced by making that the debarking point instead of Chiculdah."

4th. Capt. Abbott.

From * the information gleaned by Captain Abbott, it appears that the river between Mundleysir and Chiculdah is navigable for lightly burdened boats for the greater part of the year. Below Chiculdah, he says, the stream is broken by long ledges of rock into a number of narrow channels, forming what is called the Hirun Phall, or Deer's Leap. These rocks, he further states, were described as being extremely solid, and severed by intervals of sixteen or eighteen feet.

" A mile below this, it finds a single channel of forty yards, bounded on either side by cliffs, into which the stream, 600 yards in width, contracts in volume as it rushes down the declivity of this gorge with extreme fury."

This officer, however, after describing, from hearsay, this formidable obstacle, considers that there are reasons for believing its difficulties to be exagerated.

* This would appear to be independent of Lieutenant Anderson's.

To the information thus obtained regarding this portion of the river, through Lieutenant Mathias and Major Wilson in 1820, from Lieut. Anderson in 1841, and from Captain Abbott submitted in the present year, it may be satisfactory to append the opinion of the late Resident at Indore, Sir C. Wade.

5th. Sir C. Wade's testimony.

He writes as follows: "Having seen the obstructions of the Nurbudda in almost every part surveyed by Captain Anderson, his description of them appears to me to conform more closely to their real nature than that of any other which I have met with, excepting where he assigns a fall of eight feet at the Suhesur Durruh, near Moheysir, which does not in my opinion exceed five, and with respect to the length of the Hirun Phall fall being considerable, which did not strike me as being so. I should say it cannot exceed sixty or seventy feet, and is composed of detached masses of rock, which I am convinced would easily yield to explosion, in the hands of a scientific Engineer accustomed to the removal, by that agency, of such obstacles."

This officer concurred with Capt. Anderson in considering that the magnitude of these obstructions has been exaggerated, and recommended that the survey should be entrusted to one Engineer alone, with such assistance as might be necessary. He considered it a great mistake trusting for our knowledge of the river to partial observations made at different times and by different persons, who each had his own peculiar views on the subject.

Regarding the navigability of the stream between Tulluckwara and Baroche, there is no doubt.

IIId Portion.

Our first account is derived from Mr W. Webbe, who furnished a memorandum on this portion of the river in June 1820.

"The navigation from Baroche to Tulluckwara is not open until fifteen or twenty days after the monsoon sets in, or after the water in the Nurbudda begins to rise, which is generally about the beginning of July. It is first navigated by boats of the burden of ten kulsies or eight candies to fifty kulsies or forty candies, some laden and others not; they run up in four or five days, and sometimes in three, with a strong S. W. monsoon wind, and return heavily laden much about the same time with the current in favor. Boats of these burdens can navigate to Tullukwara until the Dewallee feast, or the month of September, after which the navigation becomes difficult, if not impracticable. Those of fifty kulsies have five men in each, and those of ten or twenty have two to four men. These draw, when heavily laden, from five to three and a half feet water; after the month of September these boats take fifteen days to go, having one or two additional hands in each, and return in six or seven days: the current and wind being then against them, they are obliged to track the boat in going up.

1st. Mr W. Webbe's Memorandum in 1820.

"After an interval of a few days, and after the Nurbudda has considerably risen, boats of a larger burden, from one hundred to one hundred and fifty kulsies (which are the largest), eighty candies or one hundred and twenty candies, leave Baroche for Tulluckwara with ten men in each. The trip up and down is performed much about the same time as those of a lesser burden; they return heavily laden, and leave this either full or empty. Boats of these burdens can only navigate until Sept., or three months at the furthest; they draw about seven or eight feet water. These boats go even as far as Deygaum Peeplia, which is about fifteen or twenty coss higher up, but not always with that facility as from Baroche to Tulluckwara, on account of the river having a rocky bed, and the current in places being very rapid: besides, there are three Ghauts to pass—Tulluckwara, (which is the most difficult,) Ukteysir, and Bhimpary. In order to get over these obstacles, the boatmen are obliged to send out long ropes from the end of their mast to be fastened to the trees on the banks of the river, and by this means draw the boat forward over the stream. This passage is performed in three or five days, and is the utmost limit

that boats have ever ventured: beyond this the navigation is said to be impracticable. Sometimes these boats in returning from Tulluckwara are interrupted in their progress at the Ghauts, which are seven in number, viz. Tatreedra, Bawapeara, Umraulee, Kundaulee, Chaundode, Kenoraulee, Norendda, and Thoomdee, owing to the fall of the freshes, or by an interval of no rain for ten days or a fortnight. The boatmen are then under the necessity of lightening the boat by emptying a part of the cargo into a smaller one alongside, and filling it again after passing these Ghauts; this is done by getting a villager from the nearest place, who understands the channel. He proceeds forward on a small raft or canoe, with a long bamboo, sounding, and the boat after him.

"All boats that leave this for Tulluckwara have a sloping roof built on them with bamboos and mats, to preserve the goods from the rain; the larger ones are also built up at the sides with the same materials, to prevent the water washing in when deeply laden. These boats are built like all others that are used on this side, having no decks, with one mast, and a triangular sail.

"Boats from sixty to seventy kulsies burden can go to Tulluckwara after Sept. lightly, but cannot return heavily laden.

"The tide is felt only as far as Reenuapoor, about twenty-five or thirty miles above Baroche, where it does not exceed a span in height.

"It is impossible to fix dates when the navigation of the river opens and ceases: all depends on the monsoon, and the quantity of rain that falls inland in the countries through which the Nurbudda takes its course: if it begins early, the boats of course leave this early, and the navigation continues as long as there is sufficient water for them to float up and down; the time stated above is generally the month fixed for it. Last year being a season of unusual heavy rain, the navigation was open until January 1820.

"The commodities carried from hence are salt, cocoanut, sugar, beetle-nuts, dates, both dry and fresh, brooms, cocoanut shell, hooka bottoms, earthenware, pepper, spices of all sorts, and curry stuff; and sometimes, when there is a scarcity, wheat, rice, and paddy. The returns are mowda, honey, timber, rafters, bamboos, bamboo mats, and sometimes till, ghee, and hemp.

"The above information is from some of the most intelligent merchants who have traded for thirty-five, twenty-five, and twenty, years up and down from this to Tulluckwara and Deygaum Peeplia: these men go themselves every year in their boats, and always assist the boatmen in navigating their vessels."

Further information is contained in the Journal forwarded by Lieutenant Mathias in 1820.

2d. Lieut Mathias' Journey in 1820.

"Here* I once more embarked on the 2d May, but in a larger description of boat, being nearly thirty feet in length, three and a half in width, with a flat bottom; the other that I had for my people was in every respect like an English boat, with a keel, &c. &c., and it drew two and a half feet water. The only interruption I received from this to Baroche, even at this advanced time of the year, was at the Bawapeer and Tantee Dag Ghauts, where the large boat was detained a few minutes by the shallowness of the water, so that there is an uninterrupted navigation for the largest description of boats that sail in the river as far as Peeplia, thirteen miles above Tulluckwara, during the rains, and for two months after it; but from the hilly and broken nature of the country, Tulluckwara is the highest situation up the river that could be fixed upon as a depôt, particularly as there is a good cart road from that to Chiculdah by Barsnee, Odeypoor, Rajpoor, and Cooksee, or by Barsnee, Paul Mahaul, Pansoaur, Rajpoor, and Cooksee, by that making the greatest possible distance for the land carriage to Chiculdah or Dhair one hundred and fifteen miles. But several miles would be saved by going to Loossaree, leaving Cooksee on the left hand; and again by not using the more frequented road by Oodeypoor but that of Paul Mahaul and Pansoaur, from which I have no doubt that the dis-

* At Tulluckwara.

tance of the land carriage from Tulluckwara to Chiculdah, as we become more familiar with the road, would be reduced to a hundred miles."

The following Journal of a voyage up the Nerbudda in the Honorable Company's Pattimar "Tapty," by Lieut. Elwon, Honorable Company's Marine, received in 1822, will be also interesting in this place.

3rd. Lieut Elwon, in 1822.

"Sailed from Baroche June 24th, and anchored at Jerresul, where we were obliged to remain during the following day, there not being sufficient water on the Jerresha Ghaut. On the 26th cleared the Ghaut, and passed through the Pora Ghaut without meeting with any more obstruction. In the evening anchored at Ramnapore; found the river here very narrow, with a continual strong ebb tide. On the 27th, entered the Bowapearra Ghaut, and employed warping until the evening of the 29th, when we cleared it. I am informed the freshes begin to come down about the lattter end of May, or beginning of June, and this part of the river remains navigable until the middle or latter end of September. The freshes continue seldom more than three days at a time, after which the water decreases, never leaving less than one fathom water at Bowapearra Ghaut; although it is fordable in the fair season, being dry or most water three feet, when troops often cross. This day entered the Amraully Ghaut, and employed warping during the following day, when we cleared it; and on the 1st July passed with little difficulty through the Nurkurry Ghaut, and in the afternoon anchored at the entrance of Cottarar Ghaut, there being no wind. Not being able to proceed, I returned in the bunder boat to Chaundode, one of the largest villages on the banks of the Nurbudda; it has a very convenient landing place, with steps built of bricks and chunam, which has a very good appearance from the water. It has some trade with Brodera, carrying there timber, for which they receive cash. To Baroche they take mowa in considerable quantity, also honey and ghee, receiving in return rice, wheat, dates, and salt; they carry up the river as far as Mokree, in small canoes called toonies, salt, native cloth, pick axes, brass dishes, and Brodera rupees, in return for which they receive bamboos, rafters and timber, which track along the bank of the river to Chaundode. The two following days employed warping through the Cotarrar Ghaut, where the bottom being hard sand and stones interspersed with rocks towards the banks, and the tide very strong, we were obliged to back the warping anchor with the boat's small anchor. On the 4th of July, while at anchor off Toomree, there being no wind, we were visited by the Jemadar, who said the country hereabouts is much infested by thieves; he has a guard of ten sepoys. Toomree is a small village. There is excellent pasturage in the neighbourhood. I saw some good cucumber plants and Indian corn here. Wheat I understand is not cultivated at all up the river. I observed hackeries at this place, the wheels of which were superior to any of the sort I have seen in other parts of India. In the afternoon a breeze springing up, made sail. Found as we approached Tulluckwara, the tide considerably stronger, and although a pleasant breeze, were obliged to resort to the warp to gain the landing place. On 5th and 6th, employed gaining information, which was but scarce, as the people apparently knew of nothing out of Tulluckwara; not even the Patell could tell me any thing of the surrounding country that I could at all think satisfactory.

"The following are questions answered by two matchies or pilots, at Tulluckwara:—

"*Question.* What time does the water begin to increase here?

"*Answer.* About 1st June, when the rains commence, and then rapidly.

"*Q.* When does it become very low?

"*A.* After the rains, or end of September, when it soon decreases, having no more than two feet and six inches water at Tulluckwara in the hot season.

"*Q.* When do the large boats come from Baroche?

"*A.* End of July or beginning of August.

" *Q.* Are those boats larger than the Honorable Company's Pattimar Tapty ?

" *A.* No ; about the same size, or fifty candies.

" *Q.* Do they go higher than Tulluckwara ?

" *A.* No, the only boats that go above this place are small canoes or toonies."

" *July 7th,* having made the necessary preparations, Mr Zigler and self proceeded up the river in the bunder boat, with six extra hands, to assist in towing, also accompanied by the pilot in a canoe. Found the tide soon after leaving Tulluckwara so strong, we were obliged to track the boat, and this could only be done by the people wading through the water. At seven, entered the Busseean Ghaut : a few minutes afterwards observed a curious rippling in the water on the larboard bow. In passing this place close, I was surprised to find the water formed a number of whirlpools : hauled the boat close round, and on towing about ten yards found her prevented proceeding by the rapidity of the tide, and it was with difficulty the boat was kept from dropping astern. The pilot now directed she might be taken further out, as there was not sufficient water ahead : this we succeeded in by securing the boat to some chinny we were amongst, but the water was running with more force, and it required great exertion for the people to stand and save themselves from being carried away ; this would have happened in all probability had it not been for the chinny, which assisted them, and also answered to catch a turn with the boat's painter. The men exerted themselves much, and seemed determined to overcome this obstruction to our progress ; but I found, after a long trial, their endeavours were quite ineffectual, although I had twelve men on the boat's painter. I asked Mr Zigler his opinion on the spot, and as I found him the same way of thinking as myself, I determined to return, and in a few minutes we were out of this perilous situation.

" On the 10th, made a second attempt with no better success. On the 11th, as the water had risen considerably, and five hands (1¼ fathoms) water on the same parts of the sandbanks abreast of Tulluckwara, I endeavoured again to get up the bunder boat, but the tide was so strong even here (where I expected to meet with little tide from the quantity of chinny) that the boat, with sails up and eight oars out, dropped astern. It is worthy of remark, that the Gunner a short time after this, who I had forgot was not aware of the difficulties I had met with, was directed by me to proceed up the river and place flags on the North side while I went up the opposite side. He took it for granted he was to go up in the boat, to do which he had to go through the Ghaut, where, after endeavouring about two hours he was not a little surprised to find himself obliged to return. The Busseean Ghaut is nearly a mile from Tulluckwara, and has a stony and rocky bottom ; the water runs with such rapidity that I have no hesitation in saying it is impossible for a boat to overcome it at this time of the year, and had I been able to have got through, I still never should have dreamt of reporting it navigable after the difficulties I met with.

" From this time I commenced the survey of the river downwards. Tulluckwara stands close to the river side on the top of the high bank : the landing-place, at the South-east side of the town, has a steep ascent, very difficult to surmount in wet weather ; the fort has but three sides, being open to the water side. There are one hundred and fifty infantry and fifty cavalry residing within the walls ; the remaining ryots live outside. There is only one boat belonging to Tulluckwara, which is for passengers. The Patell (Boman) informed me there are not more than fifteen hackeries in Tulluckwara, and that in the finest time of the year they cannot go up higher than Gurneysur, which is said to be only three coss from Tulluckwara. I was also informed the freshes rise sometimes to an extraordinary height; that they never remain there more than nine days, when the water decreases, leaving not more than eight hands water (two fathoms) at Tulluckwara. I was not able to get any information respecting the roads between this and Mhow.

" After meeting with many difficulties from the freshes, which often carried away our flags, and caused great detention, we reached Bundarea on the 24th

and were compelled to remain three days by the freshes. On the 27th, I was informed of the arrival of the Rajah of Naundode at Jawur, a village close to where the vessel was at anchor. I shall merely say I paid my respects to him. On the 1st of August, anchored abreast of Chaundode, many of our people on the sick list, principally through fatigue. Questions answered by the merchants of Chaundode :—

" *Q.* Do you trade to Mokree and above?

" *A.* Yes.

" *Q.* When does the trade commence between Chaundode and Mokree?

" *A.* In November (Cartig mina), and lasts until the end of February or beginning of March.

" *Q.* What articles do you carry there?

" *A.* Cloth, salt, and spices.

" *Q.* What do you bring away?

" *A.* From Dunneer, (above Mokree,) spars about eighteen feet long (fit for boats' masts,) and from Mokree, rafters and bamboos.

" *Q.* What places above Mokree have your boats been at?

" *A.* With distances from each other.

Southern side of the river.	Soolpan, 3 miles above Mokree.	Rajpeplia.
	Dankerrah, 3 ditto above Soolpan.	
	Shemokeree, 3 ditto above Dankerrah.	In the Bheel country, Parwee Raja Ker Dunnee.
	Warmong, 3 ditto above Shemokeree.	
	Dunneer, 3 ditto above Warmong.	
North side of the river.	Wargaum, opposite Mokree.	Rajpeplia.
	Guddur, 4¼ miles above Wargaum.	

" *Q.* What description of boat can go up to Mokree?

" *A.* Toonies drawing two hands water (three feet,) when loaded can go up as far as I have ever traded (to Dunneer.)

" *Q.* How do you get your boats up from Chaundode to Mokree?

" *A.* Tracked up; the sails are of little use then, the wind being mostly down the river.

" *Q.* How many men do you put in your boats then?

" *A.* Eight, ten, and twelve.

" *Q.* Does the water run with great force then?

" *A.* Equally as strong as in the month of July—six, seven, and eight, miles an hour.

" *Q.* How much water in Chaundode Ghaut in the dry season?

" *A.* Three hands (¾ fathom.)

" *Q.* How do you get your boats up the Mokree fall?

" *A.* They are emptied of their contents, and then hauled up the fall.

" *Q.* How many men are necessary to get the boats up the fall?

" *A.* Twenty.

" *Q.* How far have they to go before they can be re-loaded?

" *A.* From eight hundred to a thousand feet.

" *Q.* How is your merchandize transported that distance?

" *A.* On men's heads.

" *Q.* Have they any hackeries at Mokree?

" *A.* No; the country is too mountainous.

"*Q.* Can men be procured about Mokree to assist you with your boats?

"*A.* Plenty, at three and four annas per day.

"*Q.* What water at commencement of the fall?

"*A.* Two hands (three feet), and above Mokree fall 4, 5, 6, 8, 10 and 12 hands, (as much as three fathoms.)

"*Q.* How do you act coming back over the Mokree fall?

"*A.* Empty the boats at the fall, and as there is not then sufficient water to float the boats for about four or five hundred feet, they are launched along a smooth bed of stones, which are very slippery, being covered with a grassy substance, and they are guided down the fall with little trouble, when, the boats being re-loaded, proceed with ease to Chaundode in two and three days.

"*Q.* Have you ever seen or heard of boats in great danger of being lost going up the fall?

"*A.* No.

"*Q.* Can boats go up above Dunneer?

"*A.* Yes.

"*Q.* Why is trade not carried on above that place?

"*A.* Because of the thieves, who would not pay above half the price they would bargain to give for what we carry.

"I have measured one of the boats at Chaundode employed in the trade to Mokree and above. Her length twenty-two feet, breadth four feet ten inches, depth two feet, her bottom quite flat.

"*August 20th.* Reached Linnore. Learnt there is a trade to Mokree and above: their cargoes are carried to Chaundode in large boats, when they are put into the toonies and proceed as afore-mentioned.

"*August 25th.* Entered the Bowapearra Ghaut, where we met with much difficulty from a heavy fresh and unfavorable wind. On September 1st, we reached Ramnapore, since which time we got on pretty well, until the fresh commenced, which compelled us to return to Baroche."

4th. Lieut. Anderson in 1842.

Lieutenant Anderson (the report of whose journey between Mundleysir and Tulluckwara has already been given,) concludes the account of his trip as follows:

"I embarked at Tulluckwara on the morning of the 5th, and arrived at Baroche on the 7th, having performed the entire journey from Mundleysir in twelve days, not including the delays at Chiculdah and Kukranuh, and I am convinced that I should have accomplished it in less time had I been permitted to proceed altogether by water."

The following extract from the report drawn up by Captain Dangerfield, and to be found in Appendix II. of Malcolm's Central India, gives some valuable and interesting information regarding the bed and vicinity of the Nerbudda, and may well find a place here:—

Extract from Capt. Dangerfield's Report on the Geology, &c. of Central India.
Vide Appendix II. Malcolm's Central India.

"The banks of the Nerbudda for a considerable distance between Mundleysir and Chiculdah are from forty to seventy feet high, and consist, independent of a thin upper layer of rich vegetable mould, of two distinct strata of alluvium; the upper, which is very light coloured, contains a great quantity of indurated marl, and is strongly impregnated with muriate of soda or common salt, which the natives extract by lixiviation, and subsequent evaporation by the sun, in shallow compartments near the banks, and sell it to the poorer classes, particularly the Bheels, in the neighbourhood. This stratum is usually from thirty to forty feet thick.

"The one on which it reposes, and from which it is divided by a strongly-marked horizontal line, and a difference of colour, (this last being of a redder hue,)

contains a very large proportion of carbonate of soda in general, but slightly contaminated by the muriate. This bed rarely exceeds ten or fifteen feet thick, and rests immediately on the basalt forming the bed of the river. In the dry season, both these salts form a thick efflorescence on the surface of the bank, and this alone is collected by the natives. That from the lower bed forms an article of export for the use of the washermen, &c. &c.; but the soda itself is not extracted like the common salt, nor is its value but in the above way known.

* * * * * *

"The bed of the Nerbudda, consisting, as already remarked, for a considerable portion of its course of basaltic rocks, gives rise to numerous shallows and small falls. Of these, the three principal are, one at Deyree, where the river is much contracted; a second at Semadarah, a little below Mhysir; and a third at the Hurn Phal, or Deer's Leap, below Chiculdah: whence, till its entrance into Guzerat, the stream finds its way contracted to within half its usual breadth between two hilly ranges, and its course being much impeded, so as to render navigation impracticable, by large masses and elevated ridges of the rock.

"Passing higher up the stream from Mundleysir, the Northern bank, after about thirty miles, becomes rocky and precipitous, and consists of gently inclined beds, chiefly of greenstone slate, containing interposed mica in small grains. But the island of Mundatta and part of the opposite bank appear mostly to consist of hornstone slate of a reddish or greenish grey, and sometimes porphyritic. Above this for a considerable distance is, on each bank, a very wild woody tract, resembling that already noticed below Chiculdah, excepting that the river is in general deep, and less obstructed by rocks.

"This part consists of a succession of low hills and deep ravines and watercourses, is covered with high thick forests, and is scarcely capable of being travelled in most parts for seven or eight miles from the river by any but foot passengers. Iron ore abounds; but the country being almost desolate, it is only smelted at Kantcole and Chandgurh, for the supply of the Indore and neighbouring markets. It is of a good quality, but from the imperfect mode of working, the metal is little valued, excepting for common purposes. The hilly tract below Chiculdah is better populated, chiefly by wild Bheel tribes; and nearer Broach on the Southern bank are the Rajpeeply hills, inhabited by the Coolie tribe. In these hills are situated the several cornelian mines, of which a concise account has been given by Doctor Copland, in the first volume of the Bombay Literary Transactions. From Burwaee to Chiculdah, the whole valley, from the Satpoora to the Vindhya mountains, is nearly level, well watered, cultivated, and inhabited."

Supplement to Note on the Navigation of the Nerbudda River.

To make the Note more complete, a few extracts have been made from a paper on the Nerbudda river, by Lieutenant E. P. Del'Hoste, 16th Regiment N. I., to be found in the Volume of Transactions of the Bombay Geographical Society from 1836 to 1838.

Vide Note at the end.

The information afforded by Lieutenant Del'Hoste, although procured by him in 1829, will best find a place here, as it relates only to the portion of the stream between Soolpan and Tulluckwara. This officer informs us that he left Tulluckwara in April 1829, with the intention of following the course of the river towards its source as far as he could. He got as far as Soolpan,* at which point he writes, that "the stream of the river, from being from 60 to 100 "yards broad, suddenly narrows to about 60 feet, and on each side is hemmed "in with steep precipices; the middle of the river is also studded with large "rocks, and the stream, even at this season, rushes through the intervals with "surprising rapidity, dashing large pieces of wood which were floating down,

[Of Portion II.] 6. Lieut. Del'Hoste in 1829.

* Vide Transactions of the Bombay Geographical Society, from 1836 to 1838, No. VI., p. 174.

"from one side to the other, with a force which no boat could have withstood; "neither indeed would it be possible to steer a boat in such a rapid current "through such a tortuous and narrow channel. Both banks are precipitous and "covered with thick jungle, and all further progress is rendered impossible."

Regarding the stream at Mokree Ghaut, where he descended into the bed of river, he says, "At this place there is a ridge of rocks stretching completely across the "river, which is nearly one hundred yards broad, causing a fall of about 12 feet "in height. I took the opportunity of bathing in the river, the water of which "was perfectly clear. The force of the current was such as to compel me to "hold on by the large rocks, of which the river is full below the fall; the bed was "covered with large round pebbles, rendering it difficult to walk."

At the village of Goragaum (about 6½ miles below Mokree,) he says "that the "course of the river appeared impeded by rocks, through which the stream passed "with a continued gurgling sound, that could be heard at a considerable distance."

At Gurreysir, distant 6 miles from Tulluckwara on the right bank, he crossed the stream in a good sized boat, and writes as follows regarding this part of the river: "Beyond (*i. e.* above) this village, the river appeared full of large rocks, "the passage for the water between which was barely three or four feet; the total "breadth was 80 yards at this point, and the depth of the water where I crossed (in "the centre of the stream) 18 feet, measured with a pole; the right bank was low, "level, and slightly covered with jungle. * * * The left bank, on the contrary, "was precipitous and rugged towards the river, but towards the South numerous "ranges of hills covered with jungle were visible. These hills form the end of "what is called the Sutpūri range. I may add, that as far as Soolpan the features "of the country were similar."

Between Gurreysir and Tulluckwara, "the road lay over a level and well "cultivated tract of black soil. The course of the river was visible the whole "distance, and offered no impediments whatever to navigation; the depth ascer- "tained from the guides varied from twelve to fourteen feet."

A. SHAKESPEAR,

Assist. Secy. to Govt. N. W. P.

ART. VI.—*Report by the Commander, Indus Flotilla, of an Experimental Voyage up the Indus and Sutledge, made by the "Meanee," steam-tender to the Pendant-ship "Mootnee," with the "Ravee" iron flat in tow, having* 1600 *maunds of Merchandize on board: with Diary.* By Lieut. W. CHRISTOPHER, I. N., 1st Assistant, Indus Flotilla.

[Presented by Government.]

JUNE 19TH, 1847.—Left Sukkur at sunrise. The Flat draws two feet eight inches: her draft has formerly been three feet with troops &c., when being towed up from Kotree to Sukkur, in the low season. The "*Meanee*" has three months' stores, and draws forward two feet six inches, aft two feet nine inches. The flat lashed alongside of the steamer, as the vessels are said by the Officer in charge to steer better so, and are less liable to accidents. Made slow progress the first four hours, the current running three to four miles an hour, and in turnings of the river stronger. Jungle for fuel abundant. The banks of the river two to four feet high. The river is generally one thousand two hundred yards

broad: the deep channel five hundred yards in breadth, and from two to seven fathoms depth. Made twenty miles-to-day. After leaving the neighbourhood of Sukkur, there were few signs of population along the banks: the scattered villages seen were unknown to the pilot.

20*th June.*—Started early. Burnt coal to get up to Sadooja, five coss, (ten miles,) where the Sukkur moonshee was ordered to place fuel: none was found. Proceeded until 1.30, and made fast at Chuchera, to procure fuel from a deserted village, having come eighteen miles. The right bank had four villages, the left bank not one. The only part of the river where jungle fit for fuel was observed, was at Saragi village, on the right bank, three miles above Sadooja wood station: the banks of the river from two to four feet elevation. The entrance of the Bigurry Canal is marked by a very large tree, and is four miles above Saragi village.

21*st June.*—After a detention at this place, for fuel, eight and a half steaming hours, proceeded at 8.30. Current very strong in places. Passed a large village named Daraee, eleven miles above Chuchera, at 10 A. M. Good jungle near, on right bank. Passed Juffet Shah N. A. Tanda, at fifteen miles, on left bank; at nineteen miles, Jaghwanee and Bindee villages, at twenty-three miles, both on left bank. Stopt to wood at Wahidna Chuchera at 5.30 P. M. Made twenty-nine miles from starting. Paid for the wood, as the village was inhabited. The people sold us the raised sleeping-places, or platforms, which are uniformly erected in front of every hut in Sindh, and seem of the first necessity to health and comfort. They are from ten to twelve feet above the ground, and the whole family are seen on them towards sunset. Lost another hour and a half by stopping for wood. The banks of the river from two to four feet in height.

Wahidna Chuchera.

22*nd June.*—Started at five, but a rush of current round a point stopped the vessels' progress: tried to pass up on the other side of channel, and in every part, but dropped astern. This being the first time the vessel has been unable to proceed, from the currents, lashed the flat astern and tried to steam up. The eddies made the vessels twist about in so violent a manner that they were in danger of dashing alongside each other. After some risk being incurred, and the officer in charge having no confidence in the management of the vessels, so secured astern of each other, made fast and secured the flat alongside again. The engines made thirty-two revolutions throughout the day, and by the log-book on the passage up from Kotree last month, without a flat in tow, the engines made thirty-four and thirty-five revolutions, so that

the loss of speed by the flat being attached, does not by this criterion appear much. The current I estimated at seven miles an hour. Men were obtained to track her past the point, and a line got ready (or hawser.) After two or three failures, owing to the vessel swerving round against the helm, steadily steered up to the point, and passed on without the assistance of tracking. The detention in passing this point was seven and a half hours. Steady steerage is of the greatest importance on the river in overcoming a current. Made nineteen miles, and reached Gabla village at 6.20 P. M. on right bank. This is in every respect a good depôt for fuel. It is a very old village, having a deep creek leading to it, and a high bank with fuel jungle near at hand above and below.

23*rd June.*—Started at 4.35 A. M., and made good way to Bootah, on right bank: found fuel here placed by the Sukkur moonshee. It was three hundred yards away, and the detention was five steaming hours in taking it on board: such villagers as could be got were employed to save time. There is good jungle here. Made nine miles against a strong current, and secured to the bank thirteen miles from Kushmore.

24*th June.*—At 5 A. M. started: the current very strong. Reached Kushmore at 2 P. M. Found fuel placed here by the Sukkur moonshee, instead of below at Sadooja. Cast off from this at 5.50, but could not make progress: the vessel not answering her helm, made fast again—lost an hour and a half in consequence.

25*th June.*—Left at 5, and made good way for seven or eight miles, when the river became contracted in its bed to six hundred yards, and rushed down eight miles an hour. Crossed and re-crossed, but could not pass up, and after two hours sent lines on shore. Drift wood coming down, made the pilot say the river was rising. In warping past this part of the river seven and a half hours were occupied, but the distance was not more than two-thousand yards. The vessel twice sheared off the bank, breaking lines, and went down stream several hundred yards before she would answer her helm. These vexatious accidents cost us much time and labor: other steamers have found the channel bad at this place. Made nine and a half miles. Secured the vessels to a bank. It blew fresh at night—a squall with rain from the westward, and a short swell, soon got up, giving a great deal of motion to the vessels and forcing them against the bank violently; the squall was over in half an hour, and the swell as quickly subsided. From the strength of current and wind combined, extra anchors could not have been carried out.

26*th June.*—Started early and made six miles in two hours, and then could not make head over the current. Tracked and steamed for one hour, about five hundred yards, and went to Bharra station. Were detained wooding three and a half hours, though fourteen natives were employed to assist in bringing wood down. Sent a chuprassee on by land to have two hundred maunds down at the beach of next station. This is a well-selected depôt: there is good jungle a few miles down on the right bank. Entered Koondree Creek, and made seventeen miles in four hours. There is nine feet throughout the Creek: it winds amongst cotton-fields and every sign of a thickly populated country: much jungle on the island.

27*th June.*—Made four miles an hour against the current of two and a half miles, and arrived at Bhoong at 11.18. There is jungle here on both banks: the stream about two miles broad. The Koondree creek is about twenty-six miles long, and safe at this season for a steamer. We found the northern entrance with less water than the southern: there was nine feet throughout. Had tracking lines out for half an hour, and then went ahead again over the stream. Wooded in two hours at Bhoong station, and went up a creek for eight miles, and re-entered the main stream. A sand squall threatening from eastward, anchored in the channel and kept the engines working. Weighed in half an hour, but could make no progress: stood back for a quarter of a mile, and anchored for the night.

28*th June.*—Weighed early, and after trying to steam past for two hours, commenced tracking up the right bank. A north-east breeze freshening, endangered the paddle-wheel: called the men on board, and tried to steam on the shallow side of the channel, without success. Returned to former anchorage and sent for wood, when the breeze fell. At five got steam up and tried again, without success.

29*th June.*—Wood came down during the night. Started early and tried to get the vessels ahead by long warps to steady them and assist steerage in shallow water, but, from the strength of the current and eddies, the vessels turned round, carrying away or breaking the warps, and in ten minutes all the ground gained by the labor of hours was lost by the vessels not answering their helms.

30*th June.*—Though very desirous of not injuring the Merchandize, I sent yesterday for boats, determined to attempt a shallow creek, as the river is fast rising and we might warp her through, but the strength of the current, and narrowness of the creek, rendered the vessels unmanageable; throwing them aground, first on one side, and then on the other:

when aground, banks were formed rapidly between and about them. Returned to the former anchorage.

1*st July*.—The river having fallen three inches during the night, tried to steam past again, without success. After working some hours the usual squall threatened from the N. Eastward, and the vessels were taken back to an anchorage.

2*nd July*.—Put out a fourth of *Ravee's* cargo, and received in *Meanee's* eight or nine hours' fuel only. The river had fallen during the night four inches. For two hours and a half made no progress under steam, so had recourse to tracking, and in three hours having tracked and steamed two thousand yards (without the formerly recurring accidents of swerving off from the bank with the vessels' head down stream) went on by steam alone easily to Muluk, over a current of four knots. Lightening the flat seemed of very little use: the vessels did not certainly perform better under steam only, and nothing but unremitting attention to the helm, when warping and steaming up, carried the vessels past this strong part of the river's course. I estimated the breadth here at five hundred yards, having an average depth of twelve feet. Fuel jungle on right bank. Had the vessels answered their helm when in five or six feet of water, we could have come past easily the first day. They both draw less than three feet, and yet, from some cause, are quite unmanageable in a depth of five or six feet of water. The merchandize was taken on board again. The Mullukwallee wood station is at a bank of old formation, at the entrance of the Jumallee creek, and a good position.

3*rd July*.—Entered the Jumallee creek at the embouchure. The depth is four feet, width one hundred yards. Several fisheries stretched across. Proceeded up against a two knot current, but at 11.10, owing to the vessels not answering their helms, grounded badly at the junction of another creek with the Jumallee: were detained in heaving off two hours and twenty-five minutes, and proceeded. Had light rain and wind from the N.E. in the evening.

4*th July*.—Proceeded. The creek very winding: current one to two miles an hour. Shoaled suddenly from five to two feet, and grounded on a clay-knoll in a narrow part of the creek: were detained by grounding three hours fifty minutes; and fuel being expended, waited for the chuprassee who had been sent to the next station to come down. Sent up and down to near villages for fuel: were detained eight hours and ten minutes for fuel this day.

5th July.—Reached Assampore wood station, having been twelve and three quarter hours steaming through the Jumallee creek, making thirty-seven miles. Proceeded up the old bed of the river: made at sunset, twenty-three miles from Hussanpore, and secured. Creek shallow at places. Jungle adapted for fuel is plentiful about three to five miles from the river (on the left bank.)

6th July.—Had to send out warps to track ahead on entering the main stream of the river. Reached Chachera at nine, having made five to six miles this morning. Proceeded, after receiving wood and a small quantity of the best coal, and made nine miles up the Chenab. Four of the Punjaub rivers flow in one stream, and join the Indus or Attock river at Chachera, which is on the left bank and opposite to the large town and fort of Mittenkote, from which place the Indus rolls diminishing towards the sea.

7th July.—Proceeding up the Chenab: made thirty-nine miles, taking advantage of creeks. Fuel jungle on right bank.

8th July.—Started with a strong S. W. wind, and, taking advantage of creeks, made thirty-four miles. Secured at Tibber Buckree, one mile below the junction of the Sutledge with the Chenab. A large shikargah of bawn and kalli wood, belonging to Bawul Khan, fifteen miles long, extends from ten miles below the embouchure of the Sutledge to the southward, which will afford fuel for many years.

9th July.—Entered the Sutledge river, which contributes a pale muddy colored water to the Chenab: the latter has a reddish appearance. The waters of the Sutledge as they join the Chenab are thus easily distinguished. The body of water in the Chenab is so much greater that the Sutledge hardly creates any disturbance, but as it were steals along the bank, not extending one-sixth of the distance over the red waters pouring down from the junction of the three streams* Chenab, Jelum, and Ravee. The Channel of the Sutledge at its junction is one hundred and fifty yards broad and twelve feet deep: current of three miles an hour. The Ravee's breadth is eight hundred to one thousand yards: current four miles an hour. The exact channel of the Ravee could not be distinguished. The country is well populated hereabouts, and fuel jungle abundant. The banks of the river have an elevation of three to five feet generally, there being no signs of rock or any soil but alluvial from this point (the junction of the Sutledge) to Sukkur. Made nineteen miles to-day.

* The names Chenab and Ravee are given to the continuation of the four streams as they flow united to the Indus.

10*th July*.—Made three miles, and used the Chachera coal, but could not keep steam up with it: anchored. Fuel having been sent for yesterday sent up another man: detained ten hours do-day for want of fuel.

11*th July*.—No boat of fuel having come, dropped down two miles and got seventy maunds of wood from villages. At 3.40, after ten hours detention for fuel, proceeded, and made seven and a half miles against the current.

12*th July*.—Reached Mahomedpoor to-day after much labour warping against a fresh of the river: warped and steamed one thousand yards, and went on by steam alone. Four hours were occupied in warping, the hawsers being brought to the windlass: made eight and a half miles.

13*th July*.—Made good progress with the S. W. wind for three hours, when, in rounding a point or angle of the river, the vessel, going full power, was taken by an eddy and dashed stern on to the bank: the engines were stopped and reversed, or an attempt at reversing made, but, the vessel having headway, without effect. The helm was useless. Both vessels struck the bank violently. A swag of old timber entered the *Meanee's* post-bow, and as the current swept her past, the stern was somewhat bent. Finding the vessel filling, secured to the bank in slack water, and repaired the damage effectually. The whole of the lower plate was torn from the stern, and an opening of fourteen inches in extent made. Proceeded at 4.20, having been detained nine hours. The vessel, quite light, reached Moowallee wood station, ten miles above Mahomedpoor.

14*th July*.—The river here has changed its bed this season, the natives assure me within the last fifteen days, and the greatest body of water passes now four miles to the westward, so that as a depôt for wood this site is useless for the low season. Made good way until in passing a point the steamer was turned violently round by an eddy, and the flat was forced on the bank. No damage occurred to her, and the steamer's paddle-wheel was saved. Had the flat not been secured abreast, the wheel must have been seriously damaged. Increased experience with our present vessels will render accidents less frequent, but unremitting attention is most essentially necessary. Came ten miles, and was stopped by shallow water, two and a half to three feet being found all across the river.

15*th July*.—This day commenced warping over a shoal bank of loose sand having two to three feet water. The opinion of the officer in charge of the steamer was, that a channel would not form for a week at this place, but a deep channel was evidently cutting away. Three large native

boats came up under sail this afternoon, and could not pass. With much labour warped against a strong current six hundred yards, frequently losing ground from anchors dragging and warps breaking.

16*th July*.—Continued warping ahead all day: gained one thousand six hundred yards. The channel still unformed; the vessel in her own depth of water, or an inch or two more or less. The three native boats made sail, steered over the bank, and passed on to Buhawulpoor: they were deeply laden, and drew nearly three feet of water.

17*th July*.—To-day being in four feet of water, steam was got up, and an attempt made to go on by steam: the vessel sheered about from one side to the other, and dropped down by the current one mile. An anchor was let go, but it did not check her. Warped again with the heaviest anchors and chains.

18*th July*.—Warped clear, and steamed ahead one mile, in seven to eight feet of water, and was again stopped by shallow water. After three hours' warping got into a former channel and anchored.

19*th July*.—Secured off Buhawulpoor, on the right bank, one mile from the ghat.

20*th July*.—Examined and cleaned the boilers and engines.

21*st July*.—Left Buhawulpoor at 10 A. M. Made fourteen miles to-day. Peer Ibrahim Khan, Assistant Agent at Buhawulpoor, assures me that five hundred maunds of fuel are placed at stations sixteen miles apart, according to Captain Powell's request, and that the supply has been ready a long time—the wood must therefore be dry. The ferry at Buhawulpoor being on a line of intercourse with Moultan and Khorassan, yields three thousand rupees a year, the contractor paying that sum to Government—half to Moultan and half to Buhawulpoor. I could not hear of any probability of a cargo down from this to Scinde or Bombay. The Kardar of the Moultan district informed me that he had received orders to render the steamer every possible assistance, and was very attentive. The Moultan province is well cultivated. We stopped at a contracted part of the river where the vessel would not steer, and was in great danger, being turned violently round against the helm, and but just cleared the bank with reverse engines. Secured for the night at the large village of Mombaruckpoor. It is difficult to describe the unmanageable state of a vessel when swerving round by the current: it is so rapid a motion that in a narrow part of the river as this was, nothing but the greatest attention and promptitude saved her from serious injury.

22*nd July.*—Steamed past the bad part of the river assisted by a S.W. wind. On arriving at the first wood station from Buhawulpoor, instead of five hundred maunds only one hundred were produced by the peon in charge. I was again assured that there was a larger quantity at the upper stations, and that the river had taken away some of the supply laid in at this place: detained three hours. From Buhawulpoor twenty-seven and a half miles: made this distance in one day's steaming. During the afternoon of to-day had to use tracking lines for three hours to warp ahead.

23*rd July.*—Received attention from the Moultan Kardar, who had fuel and stock ready at each station. Made twenty miles to-day. By water twenty-six and a half miles from last station to this—Noor Mahomed. The steamer excites great astonishment, and sometimes much dread. The Moultan Kardar very obsequious and attentive.

24*th July.*—Made twenty-three and a half miles to-day. Distance between fuel depôts twenty-one miles by water.

25*th July.*—Made thirty and a half miles to-day; but from having taken the wrong channel, returned six and a half miles, and lost three and a half steaming hours.

26*th July.*—Could not hear of any fords: the river is said to be constantly changing; the sand is very loose. Distance between wood stations twenty-seven and a half miles: the same deficiency is found in the quantity of fuel, one hundred and seventy maunds being delivered instead of the five hundred that were ordered.

27*th July.*—Lost one hour and twenty minutes to-day by grounding: made fifteen and a half miles. The Moultan Kardars very attentive.

28*th July.*—Entered a narrow channel which has been formed during the last fifteen days; the channel of the river last year being four miles eastward, and now blocked up or very shallow. This day, from the vessels not steering in five and six feet water, could make no progress after 12 o'clock: much time is thus lost. The vessels steer for ten or fifteen minutes, and then swerve round against helm with violence: anchors are let go to check them, but much distance is lost. In a cross current they are unmanageable, when there is shoal water edging the channel on either side, and no bank for tracking.

29*th July.*—In passing up this narrow place, though during the night the river had risen eight inches, the channel was very bad, and the current turned the vessels violently round and threw them on a

bank. The anchor was let go, but they swerved with such force that it would not check them. Hove off and proceeded at 9 A. M. Current strong and channel intricate. Made eight and a half miles to Seydoo depôt.

30*th July*.—The engineer reported the port plumber-block of the engine broken: an iron band was put round, and after a detention of three hours twenty minutes, proceeded up—warped for three hours. There is much extra trouble from the vessels swerving off, breaking the warps, and being carried down by the current. The wedge bow of the *Meanee* is much against her in progress, when meeting a cross current. Some rain fell in showers at a short distance from the vessels.

31*st July*.—Vessel turned violently at a narrow part of the river where a new channel is forming: the officer in charge said he thought after six or seven days the vessels might go on. The vessels were taken up the old channel with a local pilot on board, and were fortunate enough to pass into the main stream without grounding, having three feet water only where the channel was being blocked up. Fuel was bad and steam could not be kept up: warps were constantly carried out for six hours, aided with all the steam the fuel would generate. Made nineteen and a half miles.

1*st August*.—To-day made little or no progress, being obliged to track ahead: with full power the steam when well up would not carry the vessel over the current. At 2 P. M., having made only two miles and a half, and the fuel being all expended, made fast and waited,—fuel having been sent for since yesterday. The bank of the river being for half a mile nearly straight, measured exactly several hundred yards; and by throwing a log overboard, and making signals three several times, the current was found to be running at the rate of four miles seven furlongs per hour, the progress of the vessel being about four knots per hour with the flat in tow alongside: this is much inferior speed to what the officers on board estimated the vessel's speed at, but the method of trying was accurate. A vessel going six knots an hour would have come up over the current of the Sutledge as far as this.

2*nd August*.—Went on by steam, a S.W. wind assisting the vessel. Made six miles, but after 12 o'clock could make no progress, the channel being in the centre, and shoal water extending out from either bank, so tracking was impossible.

3*rd August*.—Made half a mile against the current with a fair wind;

but from the same cause as yesterday, made no progress when the wind fell, as tracking was impossible. The river fell ten inches to-day.

4th August.—Lashed the flat astern, but it is more difficult to steer steady. The flat sheers off the vessel's quarters on either side. The vessels steamed ahead easily to a bend of the river, off the point of which the cross current made the *Meanee* sheer broad off. The flat's helm was instantly put over, but the vessels came together head and stern, and the towing beam was broken: having a spare one, fitted it and tried all day to take the vessels on, but after repeatedly grounding and carrying out anchors for ten hours, secured the vessels five hundred yards below the place we started from in the morning,—the flat being injured by the bumpkin of the *Meanee*, and the *Meanee* more slightly damaged by the stern of the *Ravee*. The vessels astern of each other will not steer in six feet of water, when going full power with a strong current, and would not go ahead in the centre of the stream.

5th August.—Secured the flat alongside the steamer, and steered close along the bank: with hawsers on shore warping ahead, made half a mile. Sent for boats to lighten the flat.

6th August.—Put into boats half the flat's lading, as the 15th of this month is the date mentioned in my orders as the latest date to quit Ferozepoor for the vessels' speedy return. Towards evening secured to the right bank, four hundred yards below the place started from The steamer has not power to take up the flat against the current with only eight hundred maunds weight on board.

7th August.—Started at 11.15, being detained for fuel; but not making any headway, out hawsers and warped ahead for three hours, and then went steadily on, gaining three miles during the day. The agents of the Nawab of Moultan evinced the utmost readiness in attending to all our demands, and payment was made in proportion to services performed. This was a part of the river that had two shoal banks, where tracking was for some distance at this season impossible.

8th August.—With a strong S. W. wind made four miles by steam, and then was obliged to track for four hours after receiving more fuel: could make no way without lines on shore.

9th August.—We have been seven days coming fourteen miles. It is now evident that the instructions cannot be carried out in respect to quitting Ferozepoor on or before the 15th of this month, and it remains an important question what ought to be done. My orders are explicit to

go to Ferozepoor with the *Ravee* in tow, but it is now past all hope getting there with the *Ravee* in tow before the current slackens and the river falls: under these circumstances, I should return at once, but my duty evidently is to carry out my orders as far as possible. If not able to tow the flat up, still the steamer as well as the flat are ordered up, and the steamer can go alone, leaving the flat at some convenient place.

10*th August.*—An extensive open forest extends through this district towards Moultan at distances from the river's bank of from two to fifteen miles, which affords abundance of fuel. The vessels in passing the entrance of a creek or small branch of the river, were set into it by the current, and for a short time were fixed across the entrance with the tide forcing them on: the rudders were a good deal strained: the vessels were detained three and a half hours for fuel, and lost time by warps breaking, &c. &c.

11*th August.*—Were nine hours tracking and steaming two thousand and five hundred yards, from vessels taking broad sheers and swerving against the helm.

12*th August.*—Jungle is not seen from the bank of the Sutledge at this part, but there is said to be abundance of fuel three and four miles from the bank, though the trees are low. Arrived at Pauk Puttun ferry at five o'clock: made arrangements, in accordance with the correspondence appended by me with the agent for Jehangeer's house, to put the remainder of the cargo, with the exception of a few cases, into country boats, and proceed on in the steamer with a few valuable cases to Ferozepoor.

13*th August.*—Procured boats and transferred the remaining cargo. Pauk Puttun town is a place of pilgrimage, not of commerce.

14*th August.*—Reported to Commander Powell proceedings. The vessel without the flat does not in some places stem the current in the centre of the stream. Made fourteen miles direct from starting place in nine hours.

15*th August.*—A large piece of forest seen to-day, thirty miles above Pauk Puttun, at Hussinpen village. To-day we passed two places where there was only three to four feet water all across the bed of the river: the channel, altering from one bank to the other, washes the sand across the old bed of the river, and time is required for a deep channel to be cut away in the new direction the waters take. Came to a depôt for wood quite flooded: the natives say the river has risen eighteen inches the last two days, and yet we have only four feet water in some places of the river. With no deeper channel the vessel without a tow goes ahead over

the current at half power, and steers better in the shoal water. River falling.

16*th August.*—In a narrow part of the river where the current was stronger than usual, the vessel swerved off against her helm, and the helm was ordered to be shifted to let the vessel turn quite round and clear the bank towards which she was running; but not turning quick enough, the port wheel took the bank. When the vessel's head was down stream the speed of the vessel must have been nine miles an hour over the ground. When this unfortunately happened, the engines were stopt, but the vessel had not lost her way: the wheel was bent a good deal, and six floats split to pieces; one rivet of the boss broken; the wheel stopt the vessel for the time. The *Meanee*, though very slightly built, is of the very best material. After this accident, as the state of the port wheel prevented the engines being turned ahead, anchors were let go for the night and lines sent to the bank.

17*th August.*—Had two places of only three to four feet water all across, the channel changing from the old bed. At one point in the river an island divided the stream into two channels. The vessel was taken up the old one: its communication with the main channel at the upper part of the island was narrowed to twenty feet in breadth and eighteen feet in depth. The bank of sand which formed one side of the channel had only two feet water on it. The steamer was warped through, the sand washing from under her as she moved ahead. Passed the first raft of timber yet met with.

17*th August.*—Passed the ruined fort of Nimrod. The channel very wide and shallow. Vessel makes good progress—thirty-three miles to-day, and the river rising.

18*th August.*—In some places the vessel hardly gained over the current, particularly near Molunkee village, where the river is contracted. Made fast to the bank opposite Ferozepoor fort at 4.50, having been 51.15 under steam from Pank Puttun to Ferozepoor. The distance in a direct line is seventy-five and a half miles,—by the river one-hundred and fifty-five miles; which gives an average of three miles an hour against the current at this season.

Principal causes of failure.

This experiment, then, must be considered to be a failure from want of power in the vessel to tow a flat of equal size and immersion against the current in the flood season.

In some places a deficiency in depth of water was experienced, but these were below Bahawulpoor.

Had the vessel steered in her own depth of water—as the old construction vessels do,—the strength of the current might nearly have been evaded, and the vessels taken up in comparatively slack water. This fault in the steerage was also the cause of all the damage sustained, or danger incurred, to the vessels on their way up.

Though the only damage sustained proceeded from a defect in the steerage, another serious source of danger is the sudden and violent storms of wind and dust to which the Sutledge is perhaps more liable than the Indus. When one of these squalls is observed approaching, I would advise the vessel being secured safely ere it strikes her, for, if it prove slight, the delay is trifling, and if severe, the atmosphere is so darkened you may injure the vessel. In this trip we experienced during two months only one squall that might have done mischief.

Squalls on the Sutledge.

The Journal comprises every subject to which you specifically directed my attention. First the channel of the river: this is an unsatisfactory part of it, for in some places the river divides into so many streams that a statement of the channel the vessel is in seldom gives a correct account of the volume of water passing down to the Indus. I hesitated to specify where the river passed down in one stream, as the entrances and embouchures of canals and creeks could not always be seen, from the river spreading out in places two or three miles in width. The channel of the main stream was always found to be loose shifting sand the same as below, but no pebbles were ever seen, the bank being uniformly of mud, never exceeding eight feet in height. No hill or rock of any kind was found on the whole course of the Sutlej up to Ferozepoor.

Channel of river.

Nature of channel.

Banks.

Ferries are noted. The natives made a mystery of fordable places in the low season: I think it is very probable that wherever there is a ford in the low season there will be a ferry established in the high. All the ferries, as before said, are noted.

Ferries.

The best places for depôts of fuel are forwarded on a separate list, but from the sudden changes the river is liable to, constant care will be necessary to watch the course the waters take, and have the fuel at an accessible point. There is jungle for fuel in sufficient abundance near to the Sutlej, though not bordering on its banks in most places, but situated some distance back.

Fuel depôts.

Taking as a criterion the passage of the *Meanee* steamer from above Pank puttun—where the flat was left—to Ferozepoor, the vessel would have arrived from Sukkur at Buhawulpoor on the thirteenth day, and at Ferozepoor on the twenty-seventh, allowing two hours daily for fueling &c.

Rate of Progress of steamer.

(Signed) W. CHRISTOPHER, *Senior Lieutenant, I. N.,*
1st Assistant Indus Flotilla.

(True Copy) (Signed) F. T. POWELL, *Commander, I. N.,*
Commanding Indus Flotilla.

(True Copy) (Signed) E. J. BROWN,
Assistant Secretary to Government of Scinde.

Hon'ble Company's Steam

Diary of an Experimental Voyage up

Hours.		Rate per hour.		Distance made.		Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.	M.	F.	M.	F.	For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
6.00	9.30	1	0	3	4	...	...	...	...	56.7	J	18	500
9.30	12.00	1	0	3	6	...	...	...	...	36.7	J	16	500
12.00	7.00	2	0	13	0	...	...	...	...	2.7	J	17	500
7.00	12.00	2	0	14	0	...	...	...	...	264	J	17	450
12.00	1.30	2	0	3	0	5½	...	...	...	2 to 7	C	18	500
1.30	7.00	...		...		...	...	...	...	...	...	...	...
8 30	12.00	...		0	4	3	...	3½	...	4	G	18	450
12.00	1.00	1	4	1	4	...	...	...	...	4	J	30	350
1.00	4.05	1	4	4	4	3	...	...	...	5	B	22	400
12.00	1.00	3	0	3	0	7	...	...	...	4	B	42	200
1.00	2.00	3	4	3	4	1	...	...	...	3	J	42	250
2.00	3.00	3	4	3	4	...	...	...	...	5	B	22	450
3.00	4.00	3	4	3	4	...	...	...	...	4	J	22	500
4.00	5.00	3	0	3	0	...	...	...	...	7	B	22	500
5.00	7.00	2	4	5	0	...	...	...	...	5	B	24	300
7.00	8.00	3	0	3	0	...	...	...	...	1 to 5	J	21	300
8.00	1.00	...		...		5½	...	...	...	...	...	...	...
1·00	4.00	1	2	3	6	...	...	...	...	1 to 5	C	30	250
4.00	5.00	2	2	2	2	...	...	...	...	1 to 4	B	24	300
5.00	7.00	1	4	5	0	...	...	...	...	1 to 4	B	24	350
5.00	6.00	2	0	2	0	...	...	...	...	1 to 6	J	23	300
6.00	7.00	1	4	1	4	...	...	...	...	2 to 7	B	21	100
7.00	9.00	1	6	3	4	...	...	...	...	2 to 5	B	15	700
9.00	11.00	1	4	3	0	...	...	...	...	2 to 6	J	21	450
11.00	1.00	1	4	3	0	...	...	...	...	1 to 7	B	20	250
1.00	2.30	1	4	2	2	...	...	...	...	1.40	B	18	700
2.30	7.00	...		...		2	...	2½	...	1.40	C	18	500
5.00	5.30	3	0	1	4	...	...	...	...	2 to 7	B	16	500
5.30	7.35	2	0	4	0	...	...	...	...	2 to 7	B	16	500
7.35	9.10	...		...		...	...	...	...	2 to 7	J	18	300
9.10	3.45	...		1	0	...	...	...	6.35	1 to 5	J	18	300
3.45	7.00	0	4	2	0	...	...	...	...	2 to 7	B	12	500
5.15	11.00	1	6	6	0	...	...	...	1	2 to 7	B	15	700
11.00	2.30	...		...		3	...	...	...	5	D	16	600
2.30	7.00	3	4	17	4	...	...	...	...	2 to 6	D	6 to 9	80
5.00	9.10	2	6	11	0	...	...	...	...	1 to 5	J	5 to 9	70 to 100
9.10	11.15	0	6	2	0	...	...	...	...	2 to 7	J	12	500
11.15	1.30	...		...		2½	...	...	...	...	...	...	...
1.30	3.00	3	0	4	4	...	...	...	...	2 to 7	J	12	5
3.00	7.00	4	2	1	0	...	...	...	...	4 to 8	J	12	800
5.00	12.00	...		...		...	...	7	...	3	J	12	500

Tender "Meanee."

the Indus and Sutlej in June, 1847.

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks. In the preceding columns, R. means right Bank. L. „ left Bank. C. „ Cultivation. J. „ Jungle for fuel. B. „ Brush wood.
				June 19th.—The spread of water ex-
3.0	....	...	88°	tends in places for four miles in
2.4	....	...	94	width. The channel is as noted.
2.0	....	...	94	June 20th.—Good fuel jungle three
2.0	Sadooja.	...	94	miles above Soodaja station and
2.0	Chachera.	...	98	cotton cultivation. Fuel was not laid
...	....	...	...	in as ordered, had to burn coal.
4.0	....	...	97	June 21st.—Vessels not steering stea-
2.4	Juffor Khan.	...	97	dily, and making no progress, lash-
2.4	Bhendy.	...	96	ed the flat astern, but could not tow
				her in that position, vessels not steer-
				ing.
2 to 5	L. Khan.	...	97	June 22nd.
2 to 4	....	...	...	
...	....	...	...	
2 to 4	....	...	98	
2 to 5	R. Gobla.	...	...	This village is very old, has a fort, and
2 to 5	....	...	85	there is good jungle in the immediate
2 to 5	....	...	...	neighbourhood for fuel. 23rd June.
...	Bootah.	...	...	Well-grown jungle near at hand.
2 to 5	Khyo Badamico.	...	95	
2 to 5	....	...	...	
2 to 5	....	...	97	
2 to 4	....	...	84	24th June.
2 to 7	... ...	...	...	
2 to 6	....	...	...	River-drift floating in large quantities.
2 to 6	....	...	94	
2 to 6	....	...	...	Passed several hillocks on river bank,
2 to 5	Kushmore. R... ...	...	...	twenty to forty feet high.
2 to 5	....	...	95	Sand-squall from the west.
2 to 6	....	...	87	25th June.—Large quantities of drift
2 to 6	Alloya. R.	...	...	coming down the stream. Warping
5 to 6	....	...	...	ahead for seven or eight hours.
5 to 6	....	...	95	
3 to 5	Dadalput.	...	...	Squally, with light rain from ahead.
3 to 5	R. Bushka.	...	84	26th June.
3 to 5	R. Bhaina.	...	100	
1 to 2	Many Villages and	...	83	Cotton cultivation on all sides.
1 to 2	much cultivation.	...	84	27th June.—Plenty of jungle all about
3 to 5	Bhoong.	...	97	this station. The whole spread of
...	Ditto	...	100	water here is two miles across.
2 to 6	... .	...	98	
3 to 5	... .	...	90	
5 to 6	... .	...	...	28th June.—Being detained here four

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
12.00	7.00	...	...	...	...	7	...	...	...	...	...
5.00	12.00	...	...	...	...	...	...	3	J	12	500
12.00	7.00	...	...	...	...	14	...	3	J	12	500
5.00	12.00	...	...	...	...	...	...	3	J	12	500
12.00	7.00	...	...	...	...	14	...	3	J	12	500
5.00	12.00	...	...	...	...	...	...	3	J	12	500
12.00	7.00	...	...	...	...	14	...	3	J	12	500
5.00	8.00	...	...	...	...	3	...	3	J	12	500
8.00	12.50	0 4	2 0	...	...	...	4	3	J	12	500
12.05	3.55	3 0	12 0	...	...	...	...	1 to 10	J	12	500
3.55	4.21	1 0	0 4	...	...	...	...	2 to 7	B	12	700
4.21	7.00	...	...	2.40	...	...	...	2 to 7	B	12	700
5.30	11.10	2 4	7 4	...	...	...	...	2 to 4	J	4 to 9	80
10.10	1.45	5 0	...	2.35	...	...	...	...	...	...	...
1.45	6.30	3 0	15 0	...	...	...	...	2 to 7	J	4 to 10	70
4.30	7.00	3 0	7 4	...	...	...	...	1 to 7	C	3 to 9	50 to 100
7.10	10.50	...	...	...	3.50	...	...	...	...	...	...
10.50	5.00	...	...	6.10	...	...	...	...	...	...	...
4.30	6.30	3 0	5 0	...	...	...	...	2 to 5	C	4 to 9	70
6.30	8.00	3 0	4 4	...	...	...	...	...	C	4 to 7	70
8.00	9.00	3 0	3 0	...	...	...	...	...	C	4 to 7	70
9.00	10.00	3 0	3 0	1¼	...	...	...	...	C	12	70
11.00	12.00	2 6	2 6	...	...	...	...	...	J	12	500
12.00	1.00	3 2	3 2	...	...	...	...	...	J	12	500
1.00	2.00	2 4	2 4	...	...	...	...	...	C	6	200
2.00	3.00	3 0	3 0	...	...	...	...	...	C	5	300
3.00	4.00	3 4	3 4	...	...	...	...	...	J	5	400
4.00	5.00	3 0	3 0	...	...	...	...	...	J	5	500
5.00	6.40	3 0	4 4	...	...	...	...	...	J	5	600
5.00	6.00	1 4	1 4	...	...	...	...	2 to 5	J	12	200
6.00	7.00	1 0	1 0	...	...	...	...	1 to 4	B	18	200
7.00	8.00	0 4	0 4	...	...	...	1	...	C	18	500
12.00	1.00	...	...	3½	...	...	...	6 to 7	C	18	400
1.30	2.00	0 4	0 2	...	...	...	...	1 to 5	B	18	400
2.00	6.00	1 4	6 0	...	...	...	...	...	B	18	400
5.00	6.00	3 0	3 0	...	...	...	...	1 to 5	B	12	200
6.00	7.00	3 0	3 0	...	...	...	...	1 to 5	B	12	200

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
				days it was a good opportunity to calculate the body of water passing down the channel of the Indus at this season and place. It was found to be 165,000 cubic feet per second. This is, however, but an approximation, and creeks drain off a good deal joining below.
...	....	...	...	
4 to 6	....	...	86°to	29th June.—Had the vessels steered in
4 to 6	....	...	100	six feet of water they would have passed up, the current being slack
4 to 6	....	...	85	30th June. [in that depth.
4 to 6	....	...	101	
4 to 6	....	...	86	1st July.
4 to 6	....	...	108	
				2nd July.
4 to 6	....	...	99	
4 to 6	....	...	102	After 4 hours warping in a 5 to 6 knots
3 to 6	....	...	...	current, got into slacker water.
3 to 6	Mulluknato.	...	...	
3 to 5	....	...	...	
2 to 3	Jumallee.	...	...	3rd July in a creek detained by fisheries.
...	....	...	86	Grounded at a sharp angle, the creek
2 to 3	....	Ferry.	102	narrow. Thickly populated.
1 to 3	Dahumkhan.	...	92	4th July.
...	....	...	97	A clay knoll.
...	....	...	90	
				5th July.
1 to 3	L. Kollapore.	...	88	Creek winding.
1 to 3	L. Doulutpore.	...	...	Proceeding up the old bed of the river,
...	L. Ahabadpore.	...	...	only filled in the flood season. Jungle
...	L. Hussanpore.	...	...	five miles from the bank.
...	....	...	...	
...	....	...	...	
...	L. Hussan Khan.	...	...	Entered Chachura Creek.
...	L. Rahimon.	...	...	
...	L. Khodabuksh.	...	...	
...	L. Rakinpore.....	...	...	
...	....	...	...	
1 to 4	....	...	86	6th July.
...	....	...	87	Entered another creek.
...	L. Chachera.	Ferry.	...	Mittenkote opposite on the right bank.
3 to 5	....	...	99	
...	....	...	101	
2 to 5	L. Goodpore.	...	96	Thickly populated.
				7th July.
1 to 2	....	...	82	Proceeding up the Chenab river or
1 to 2	R. Nassolla.	...	...	Gharsa.

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
7.00	8.00	3 0	3 0	...	...	...	...	...	J	12	200
8.00	12.00	3 4	14 0	...	...	...	...	...	B	12	300
12 00	2.00	2 4	5 0	...	...	...	...	...	B	12	200
2.00	4.00	3 0	6 0	...	...	...	...	..	J	12	400
4.00	5.00	2 4	2 4	...	...	...	...	4	B	18	300
5.00	7.30	2 0	5 0	...	...	...	...	4	B	16	300
4.30	8.00	3 0	10 4	1	...	...	...	2 to 6	J	30	580
8.00	9.00	3 0	3 0	...	...	...	...	...	J	12	200
9.00	10.00	2 4	2 4	...	...	...	...	1 to 5	J	12	200
10.00	11.00	2 4	2 4	...	...	...	...	...	J	12	400
11.00	12.00	3 0	3 0	...	...	...	...	...	J	12	500
12.00	4.00	2 6	11 0	...	...	...	...	...	...	18	500
4.08	5.00	3 0	3 0	...	...	...	...	...	...	12	500
5.00	6.00	2 4	2 4	...	...	...	...	...	...	18	100
6.00	7.00	2 4	2 4	...	...	...	...	...	...	18	300
4.00	5.00	2 4	2 4	...	...	...	...	3	J	18	700 to
5.00	6.00	2 4	2 4	...	...	...	...	3	C	18	800
6.00	9.10	2 0	6 2	...	...	...	..	1 to 5	C	12	150
9.10	10.40	...	...	...	1½	...	...	3	C	10	300
10.40	3.00	1 4	6 4	...	...	...	...	1 to 7	C	9	400
3.00	4.00	1 4	1 4	...	...	...	...	2 to 6	B	12	300
4.00	6.00	1 4	3 0	...	...	...	...	...	...	9	300
5.00	7.00	2 4	2 4	...	...	...	...	3 to 5	C	8	500
5.00	8.30	1 0	3 4	...	...	...	...	2 to 3	C	5 to 12	300
8.30	7.00	...	...	10½	...	...	...	2	B	9	300
5.00	12.00	...	...	7	...	...	...	...	...	...	...
12.00	4.00	...	...	4	...	...	...	...	...	...	...
4.00	7.00	1 2	3 6	...	...	...	...	2 to 5	B	9	250
6.30	9.30	0 4	1 4	1½	...	...	...	1 to 4	B	12	300
9.30	10.30	0 4	0 4	...	...	...	...	...	B	12	300
10.30	2.30	0 2	1 0	...	...	...	4	...	B	18	200
2.30	4.30	0 6	1 4	...	...	...	...	...	B	12	400
4.50	6.50	2 0	4 6	...	...	...	...	6	C	15	400
4.40	6 30	0 4	2 0	...	...	...	...	4	B	18	300
6.30	12.00	...	...	...	5.50	...	...	3	B	12	400
12.00	4.25	...	...	...	4.25	...	...	3	B	12	400
4.25	7.00	2 4	7 0	...	...	...	...	1 to 5	C	9	500
4.40	5.00	2 4	1 0	...	...	...	...	1 to 5	J	18	300
5.00	6.25	...	...	1.25	...	...	...	...	J	...	...
6.25	12.00	1 0	5 4	...	...	...	...	1 to 7	B	12	480

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
...	R. Kulburdina.....	...	...	
1 to 2	R. Pereira.	...	97°	
...	....	...	104	
...	R. Dillygol.	...	100	Large jungle on right bank.
2 to 3	R. Maldur.	...	...	
2 to 3	....	...	...	8th July.
3 to 6	R. Koodpeene.....	...	81	Entered a creek. Were detained for wood; good jungle for fuel.
...	L. Tibboo.	...	98	
2	L. Lall Chaddy.	...	...	The S. W. Moonsoon asssisted us to day.
2	L. Melangby.	...	...	
1 to 2	L. Mirwallee.....	...	106	On left bank good jungle for fuel.
1 to 3	R. Mittoo.	...	...	
1 to 2	....	...	104	
1 to 2	.. ..	...	...	Entered a creek.
1 to 2	To Bukree.	...	...	
				9th July.
1 to 2	....	...	86	Channel not discernible at the junction
3 to 4	R. Dammer.	...	...	of the Sutledge and Chenab.
2 to 4	Aucherpoor.	...	...	Entered Sutledge, one sixth the size of
3	R. Lungalai.	...	...	the Chenab, or Gora, or Ravee, into
2 to 4	....	...	98	which it falls.
2 to 4	....	...	102	About this place there was a a ford in
2 to 5	....	...	...	the low season of 1845-46.
2 to 3	Chino.	Ferry.	98	Between the large towns of Ahmedpoor and Jillapore.
2 to 4	....	...	85	10th July.—Passed over one part of the
3½	....	...	...	river having five feet water; across, seven hundred yards broad.
...	....	...	...	11th July.—Detained for fuel; sent back
...	....	...	100	to village one mile for some.
2 to 3	....	...	98	
	L. Jungua.	...	...	12th July.—Received a boat-load of fuel.
4 to 5	....	...	84	
4 to 5	....	...	...	Had the vessel steered in six feet water,
4 to 6	....	...	...	could have gone ahead over the cur-
3 to 5	....	...	102	rent in that depth: the eddies sheer the vessels off the bank, and cause delay.
4 to 6	Mahomedpore.	...	97	July 13th.—By not answering helm in
2 to 3	....	...	85	an eddy, stove the *Meanee's* bow in,
3	....	..	...	on striking the bank; but had the
3	....	...	...	vessels answered their helms this could
2 to 5	L. Moradpoor.	...	...	not have happened.
				14th July.
1 to 3	Noherwallee.	...	84	
...	....	...	97	
2 to 5	....	...	106	In passing a contracted part, vessel

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
12.00	6.00	1 2	7 4	...	...	...	...	3	B	10	400
6.00	7.00	...	...	...	1	...	...	3	B	12	400
8.00	12.00	...	...	...	...	...	4	3	B	3	800
12.00	7.00	...	...	...	...	...	7	3	B	3	800
6.00	12.00	0 2	1 4	...	6	...	...	3	B	3	800
12.00	7.00	...	...	...	...	7	...	3	B	3	800
6.00	12.00	...	0 4	...	...	6	...	2	B	3 to 6	600
12.00	6.00	...	0 4	...	...	6	...	2	B	...	...
6.00	12.00	0 2	3 0	....	...	...	3	2	B	2½ to 6	600
12.00	7.30	0 2	1 7	...	4	...	4	2	B	...	...
5.00	8.25	1 0	3 3	...	...	...	...	3	C	6	200 to 500
...	...	...	...	...	...	...	...	5	C	12	500
9.00	10.00	1 4	1 4	...	..	...	...	3	B	10	450
10.00	12.00	2 4	5 0	...	...	...	...	3	B	9 to 18	400
12.00	1.00	...	...	...	...	...	...	4	B	18	150
1.00	2.00	2 4	2 4	...	...	...	...	3	B	9	250
2.00	3.00	2 0	2 0	...	...	...	...	3	B	12	250
3.00	5.00	1 6	3 4	...	...	...	...	4	B	8	500
5.00	7.00	1 2	1 2	...	...	...	...	5	B	8	500
6.00	9.00	2 0	6 0	...	...	...	...	4 to 8	B	12 to 48	400
9.00	10.30	2 0	3 0	...	...	...	...	5	B	12	400
10.30	1.30	...	...	3	...	...	...	4	B	12	400
1.30	3.00	1 4	2 2	...	...	..	...	3	B	10	500
3.00	6.00	1 0	3 0	...	...	...	3	3	...	10	250
6.00	7.00	1 0	1 0	...	...	...	1	2	...	12	400
5.00	6.00	2 0	2 0	...	...	...	...	3	B	15	600
6.00	8.00	1 0	2 0	...	...	...	...	4	J	15	600
8.00	11.00	3 0	9 0	...	...	...	...	3	B	15	600
11.00	2.00	...	...	3	...	...	...	3	B	15	600
2.00	5.00	3 0	9 0	...	...	...	...	4	B	18	450
5.00	7.00	1 4	1 0	...	...	...	...	3	B	18	500

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
2 to 4	....	...	...	swerved against her helm and endangered the flat, which struck the bank violently at 6: grounded in two feet.
2 to 4	....	...	96°	
2	....	...	99	15th July.—Heaving ahead in the vessels' depth—a few inches at times more, at times less.
2	....	....	...	
2	Fotchbuddie.	Ferry.	97	16th July.—Ditto. Attempted to steer ahead in four to six feet, but went back eight hundred yards.
2	....	...	...	
3	Chim.	...	...	17th July.—Stove ahead in four feet against the current, and regained the ground lost yesterday by attempting to steam, and warped half a mile further.
3	....	...	97	
3	....	...	87	18th July.—A great part of to-day warping ahead in the vessels' own draft of water: a new channel forming, the old one blocking up. Had the vessels steered in from four to six feet the detention would have been much less.
3	....	...	98	
3	Bahawulpore.....	Ferry.	97	19th July.—Bahawulpore at 8.25 A. M. The channel has changed, and the steamer cannot go to Bahawulpore Ghat, but is secured on the Moultan side in twelve feet of water.
4	....	...	...	20th July.—Remained at Bahawulpore.
3	L. Gongah.	...	86	
2	L. Bukkurpore.	...	...	Channel very intricate.
				21st July.
4 to 5	....	...	98	Current strong.
2 to 3	R. Rotta.	...	...	
2 to 3	L. Godpore.	...	...	
2 to 3	....	...	...	
2 to 4	....	...	87	Drifted one mile down river, from vessels not answering their helm.
				22nd July.—The channel is two hundred and fifty yards wide, and there is
2 to 4	Mombaruckpore R.	...	...	
2 to 4	Nawalpoor, L.....	...	...	forty-eight feet of depth here; a deep
2 to 5	L. Cassim Thalo.	Ferry.	92	rut from the setting in of current
2 to 5	....	...	...	against the bank of small extent.
4 to 5	Gooldera L.	...	...	Heaving ahead with hawsers.
4 to 5	....	...	...	
3 to 4	Honddijok R.....	...	...	23rd July.
3 to 4	....	...	...	
2 to 3	Mungwance L.	Ferry.	...	A few date trees and large baubool and
2 to 3	Ins. R.	...	...	blackwood clumps of trees.
1 to 3	Lall Tuharrie L.	Ferry.	...	
3 to 5	Keror R.	...	...	The last hour made little progress.

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
5.00	8.00	...	...	3	...	...	...	3	B	18	500
8.00	11 00	2 4	7 4	...	...	...	...	2	...	15	470
11.00	12.00	3 0	3 0	...	...	...	...	4	J	15	500
12.00	1.00	3 0	3 0	...	...	...	...	5	J	15	500
1.00	2.00	1 0	1 0	...	...	...	...	4	B	18	300
2.00	4.00	3 0	6 0	...	...	...	...	3	B	9	400
4.00	6.00	2 4	5 0	...	...	...	...	2	B	9	300
6.00	7.00	2 0	2 0	...	...	...	...	4	C	9	300
6.00	8.00	3 4	7 0	...	...	...	...	3	B	9	250
8.00	10.00	...	...	...	...	...	...	3	C	6	200
10.00	11.00	3 0	3 0	...	...	...	...	4	J	7	250
11.00	12.00	2 4	2 4	...	...	...	...	3	J	4½	150
12.00	4.00	2 1	8 4	...	...	...	...	3	J	8	450
4.00	6.00	2 0	4 0	...	...	...	...	2	C	3	400
4.30	6.00	...	...	1½	...	...	...	3	C	6	450
6.00	10.00	1 4	6 0	1½	...	...	...	2	B	4 to 9	400
10.00	12.00	2 0	4 0	...	...	...	...	3	J	12	450
12.00	3.00	1 0	3 0	...	...	...	...	4	B	8	425
3.00	4.00	2 0	2 0	...	...	...	...	3	B	12	300
3.00	4.00	2 0	2 0	...	...	...	...	3	B	12	300
4.00	5.00	2 0	2 0	...	...	...	...	5	B	12	150
5.00	6.00	1 0	1 0	...	...	...	...	3	B	12	300
5.10	6.10	1 0	1 0	...	...	...	...	5	B	12	400
6.10	7.15	...	...	1¼	...	...	...	4	B	12	....
7.15	8.10	2 0	1 6	...	...	...	...	3	B	12	...
8.10	9.30	...	...	...	1.20	...	...	4	J	2 feet	...
9.30	10.10	1 4	1 0	...	...	...	...	4	B	9	...
10.10	11.20	...	...	1.10	...	...	...	2	B	12	200
11.20	12.00	1 4	1 0	...	...	...	...	5	B	18	150
12.00	4.10	2 0	8 0	...	...	...	...	3	J	15	200
4.10	5.10	...	...	...	...	1.10	...	4	B	12	200
5.10	7.30	2 4	6 0	..	...	...	...	..	...	...	...
4.50	6.10	1 4	2 2	...	...	...	...	5	B	12	150
6.10	7.25	...	...	1.25	...	...	...	4	C	12	150
7.25	9.50	2 2	5 4	...	...	...	...	3	B	12	150
9.50	11.05	...	...	1¼	...	...	...	3	B	12	150
11.05	12 00	1 4	1 3	...	...	...	...	4	B	12	600
12.00	1.00	1 0	1 0	...	...	...	...	2	B	6	100
1.00	7.00	...	...	...	...	6	...	2	B	5 to 6	801
6.00	7.00	0 4	0 4	...	...	...	...	2	B	5 to 6	80
7.00	8.00	...	...	1	1	...	...	2	B	5 to 6	80
8.00	10.00	1 0	2 0	...	...	...	...	3	B	6 to 7	100
10.00	11.00	1 0	1 0	...	...	...	...	2	B	5 to 7	180
11.00	12.00	1 0	1 0	...	...	...	...	3	B	7 to 9	300

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
2 to 4	Noor Mahomed.	Ferry.	...	24th July.
1 to 3	Insuf-ka-gote L.	...	...	
1 to 2	Poor Mahomed.	...	...	
1 to 2	Laboo.	Ferry.	...	A good site for a fuel depot; jungle
2 to 4	Several small villages.	...	...	near, and the water deep.
1 to 2		...	...	
...	....	...	...	A grove of date trees.
2 to 3	....	...	...	25th July.
1 to 2	....	...	...	
1 to 2	....	...	...	Wrong channel.
1 to 2	....	...	...	Fueling jungle four miles distant.
2 to 3	....	...	...	
1 to 3	Khyrpore R.	Ferry.	...	A good depot; high bank, and jungle
1 to 3	....	...	...	near.
				26th July.
3	Doopore.	...	...	S. W. wind of great assistance.
2 to 4	....	...	...	
2 to 3	....	...	...	
2 to 3	Sudpoor } L.....	Ferry.	...	Channel very intricate. Two years ago
2 to 5	Chullanee }	...	...	the river was fordable here in the
2 to 5	....	...	...	low season.
2 to 5	....	...	...	
3 to 5	....	...	...	
3 to 4	.. ..	...	...	27th July.
...	Mardpoor R.	Ferry.	...	S. W. wind of great assistance.
2 to 4	....	...	...	
3	....	...	...	Aground from not steering: good fueling
2 to 4	....	...	...	jungle.
4 to 5	Rhaimrail L.	Ferry.	...	The river fordable here (it is said) in
3 to 4	....	...	...	the low season.
2 to 5	Alliwal L.	...	...	Jungle on both banks.
2 to 5	....	...	...	A squall of sand at N. E. Furled awn-
...	....	...	...	ings &c.
				28th July.
3 to 5	....	...	...	S. West wind, and cloudy.
3	Moglah R.	Ferry.	...	
2 to 6	....	...	...	Went up a new channel four miles west-
3	Kughi L.	...	...	ward; a former bed of the river, and
3 to 4	....	...	...	very recently formed. River divided
2 to 5	....	...	...	into many channels and cross currents.
3	....	...	...	Made no progress, from not answering
				her helm.
3.4	....	...	...	29th July.
5.4	....	...	...	
3 to 4	Moraka L.	Ferry.	...	Channel intricate.
3 to 4	....	...	...	
3 to 5	....	...	...	

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
12.00	4.00	1 4	6 0	...	...	...	2.0	3	B	12	300
4.00	5.00	0 4	0 4	...	...	...	0.4	3	B	15	250
4.55	6.20	1 0	1 4	...	...	...	...	4	B	12	400
6.20	10.00	...	...	...	...	...	...	...	...	...	...
10.00	12.00	1 2	2 4	...	...	...	...	3	B	10	320
12.00	4.00	0 2	1 0	...	...	...	4	3	B	12	300
4.00	5.00	2 0	4 0	...	...	...	...	2	B	12	300
6.00	7.00	1 4	1 4	...	...	...	...	1	B	10	300
6.00	8.00	2 2	4 4	...	...	...	...	3	B	9	300
7.00	8.00	2 0	2 0	...	...	...	...	3	B	9	150
8.00	9.00	0 2	0 2	1	...	...	...	3	B	...	...
9.00	10.00	2 0	2 0	...	...	...	...	3	C	9	300
10·00	11.00	1 4	1 4	...	...	...	...	2	C	9	500
11.00	12.00	2 0	2 0	...	...	...	...	2	B	12	200
12.00	3.00	2 0	6 0	...	...	...	...	3	J	15	300
5.00	9.00	...	...	...	...	...	...	4	B	9	500
9.00	10.00	0 4	0 4	...	...	...	1	3	B	9	500
10.00	11.00	0 4	0 4	...	...	...	1	3	B	9	500
11.00	12.00	1 0	1 0	...	...	...	1	2	C	9	500
12.00	2.15	0 4	1 2	...	...	...	2¼	3	C	9	500
2.15	7.00	...	...	4¾	...	...	...	2	C	9	500
5.20	7.00	1 4	2 0	...	...	...	...	3	C	12	450
7.00	12.00	0 6	3 6	1	...	...	1½	3	B	9	500
12.00	5.15	0 4	2 5	...	...	...	5.18	2	B	12	500
5.11	7.00	...	...	...	1¾	...	...	2	B	10	500
5.00	8.00	0 2	0 6	...	...	...	...	3	C	12	450
8.00	10.50	...	...	2.50	...	...	...	3	C	12	450
10.10	12.00	0 4	0 6	...	...	...	1.10	3	C	12	450
12.00	2.30	...	...	...	...	...	...	3	B	12	500
2.30	7.00	...	...	...	...	...	...	6	C	12	500
5.15	12.00	...	...	...	...	6.45	...	3 to 6	C	12	500
12.00	2.35	...	...	...	...	2.35	...	...	C	12	500
2.35	7.00	...	...	...	...	3.25	...	...	C	12	500
5.00	10.50	...	...	...	...	...	...	3	C	12	500
10.50	12.00	0 2	0 3	...	...	...	1.10	3	B	10	500
12.00	6.00	0 1	0 6	...	1	...	4	...	...	10	500
5.00	12.00	...	...	...	...	...	...	3	B	10	500
12.00	1.55	...	...	1.55	...	...	...	3	B	10	500
1.55	6.00	...	...	...	...	...	...	3	B	9	500
5.00	11.45	...	...	6 to 5	...	...	...	3	B	12	500
11.45	12.00	...	...	...	...	...	¼	3	B	15	400
12.00	6.00	0 4	3 0	...	...	...	3	3	B	17	300
5.00	9.55	...	...	2.55	...	...	...	3	B	10	450

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
2 to 4	Hydoo R.	...	...	Full steam, and hawsers out.
3 to 5	....	...	...	30th July.
2 to 5	....	...	...	
...	....	...	...	Repairing engine.
3 to 4	Kowrah R.	...	...	
4 to 5	....	...	...	Warping and steaming.
2 to 3	....	...	...	
2 to 4	....	...	...	31st July.
2 to 5	....	...	...	
2 to 5	....	...	...	
...	Sakkoke R.	Ferry.	...	A rich country.
...	....	...	...	
...	....	...	...	
...	....	...	...	
2 to 3	....	...	...	Good fuel jungle.
4 to 5	....	...	...	1st August, 1847.—No progress.
4 to 5	....	...	...	Tracking and steaming.
4 to 5	....	...	...	ditto ditto
4 to 5	....	...	...	ditto ditto
3 to 5	....	...	...	ditto ditto
3 to 5	....	...	...	Tried current: found it 4.7 per hour.
3 to 5	....	...	...	2nd August.
3 to 5	Mharree L.	...	...	Tracking and steaming nearly all day, wherever there was a steep bank.
3 to 5	....	...	...	
4 to 5	....	...	...	3rd August.
4 to 5	Mahtoo R.	Ferry.	...	
4 to 5	....	...	...	Could not make way, there being no steep bank for line; and secured the flat astern.
4 to 5	....	...	...	
4 to 5	....	...	...	
4 to 5	....	...	...	4th August.—Trying all day to make progress with flat astern, but from the vessels not steering, lost ground.
4 to 5	....	Ferry.	...	
4 to 5	....	...	...	
4 to 5	....	...	...	
4	Maptoo.	Ferry.	...	5th August.
4 to 5	....	...	...	Lashed flat alongside.
..	....	...	...	Warping and steaming; fuel bad.
4 to 5	....	...	...	6th August.—Discharged into country
4 to 5	....	...	...	boats half the cargo. Made no pro-
4 to 5	....	...	...	gress: the vessels will not steer in six
4 to 5	....	...	...	feet water, and in deeper water the current is strong.
4 to 5	....	...	...	7th August.—Cutting fuel. Vessels
4 to 5	....	...	...	steered better in six and seven feet,
4 to 5	....	...	...	and passed up.

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
7.55	11.00	1 0	3 1	...	...	...	...	3	B	12	450
11.00	12.00	0 2	0 2	...	...	...	1	2	B	12	450
12.00	2.15	...	...	2¼	...	...	...	2	C	12	300
2.15	6.00	0 2	1 1	...	...	...	2	2	J	10	350
5.30	8.00	0 6	1 7	...	...	...	4	3	B	6 to 17	300
8.00	9.45	...	...	1¾	...	...	...	2	B	12	300
9.45	12·00	1 4	1 0	...	1.10	...	...	3	B	12	300
12.00	7.00	0 6	5 2	...	...	...	3	2	B	12	300
5.00	7.00	0 2	0 4	...	...	...	2	2	B	12	350
7.15	10.35	...	...	3.20	...	...	...	2	B	10	350
10.35	12.00	1 0	1 4	...	...	...	...	2	B	11	350
12.00	1.15	1 0	1 1	...	...	...	...	3	B	12	300
1.15	2.10	...	...	1	...	...	...	3	B	12	300
2.10	4.55	2 4	6 2	...	...	...	...	3	B	12	300
4.55	7.00	...	...	2.05	...	...	...	3	B	12	300
5.00	6.00	1 4	1 4	...	...	...	...	4	B	18	300
6.00	8.00	2 6	5 2	...	...	...	...	3	B	16	300
8.00	9.00	2 4	2 4	...	...	...	...	3	B	17	250
9.00	10.00	2 0	2 0	...	...	...	...	4	B	6 to 18	500
10.00	11.00	0 4	0 4	...	...	...	...	3	B	6 to 17	450
11.00	12.00	...	...	...	...	...	1	3	B	6 to 17	450
12.00	6.00	...	...	...	...	...	6	3	B	...	450
2.25	6.30	...	...	...	...	...	1.05	2	B	12	450
7.30	9.10	1 0	2 6	...	...	...	...	3	B	10	400
9.10	12.00	1 4	1 6	1½	...	...	...	3	B	12	450
12.00	1.30	2 0	3 0	...	...	...	..	3	C	10	400
1.30	3.55	...	...	2.25	...	...	...	3	B	10	400
3.55	6.00	0 4	1 2	...	...	...	...	4	C	12	450
6.00	12.00	...	...	...	...	...	...	...	...	...	...
12.00	6.00	...	...	...	...	...	...	...	...	...	...
9.30	12.00	2 4	6 2	...	...	...	...	3	C	12	400
12.00	3.30	3 4	10 6	...	...	...	...	3	J	5 to 15	1000
3.30	5.00	...	...	1½	...	...	...	4	...	...	...
5.00	7.05	3 4	7 1	...	...	...	...	2	B	6 to 18	800
5.00	8.00	3 0	9 0	...	...	...	...	3 to 6	J	12	700
8.00	10.00	2 4	5 0	...	...	...	...	...	B	14.6	1400
10.00	11.20	2 0	2 6	...	...	...	...	...	J	12	700
11.20	0.40	...	...	2.20	...	...	...	...	J	12	700
0.40	3.00	4 4	10 4	...	...	...	...	1 to 4	C	9	900
3.00	5.10	4 4	9 6	...	...	...	...	...	B	10	2000
5.10	6.15	...	...	1.05	...	...	...	...	B	9	700
6.15	7.05	5 0	4 2	...	...	...	...	...	C	10	900

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
3 to 5	....	...	...	8th August.
3 to 5	L.	...	...	Warping and steaming. An important
4 to 5	Momokee.	Ferry.	...	line of traffic. Bank cutting away,
3 to 5	....	...	...	anchored in the stream.
2 to 5	....	...	...	9th August.
4	Rath.	...	...	Lost much time to-day by accidents.
4	....	...	...	Vessels not steering.
4 to 5	....	...	...	
				10th August.
4 to 5	....	...	...	
4 to 5	....	...	...	
3 to 5	....	...	...	
2 to 5	....	...	...	Channel narrow, but the whole country
4	....	...	...	swamped.
2 to 5	....	...	...	
4½	....	...	...	
3 to 4	....	...	...	
2 to 4	....	...	...	11th August.
2 to 4	....	...	...	
2 to 5	....	...	...	
2 to 5	....	...	...	
4 to 5	....	...	...	Could make no progress, warping.
4 to 5	....	...	...	ditto. ditto. tracking.
4 to 5	....	...	...	12th August.
3 to 5	....	...	...	
3 to 4	Buchewate L.....	...	...	
3 to 4	....	...	...	
4	Mulkaree R.	Ferry.	...	
3 to 5	Mamokee R.	Ferry.	...	
				The ferry of Pank Puttun town.
				13th August.
...	....	...	...	Transferred the remainder of the flat's
...	....	...	...	cargo into boats, and left her secured
				to the bank.
3 to 5	Wehale L.	...	...	14th August.
3 to 5	....	...	...	
...	....	...	..	Along a general bank of brushwood,
3 to 4	Ratteh R.	...	...	there are patches of jungle of large
				trees.
2 to 7	....	...	...	15th August.
...	Gundookh.	...	...	
...	Hussansheb.	Ferry.	...	Near this place some good jungle for
..	....	...	...	fuel.
2 to 5	....	...	...	Water much spread. Channel not de-
2 to 3	Sairoo L.	Ferry.	...	fined. At this place in the low season
2 to 5	....	...	...	of '41 sheep could ford the river, and
2 to 4	....	...	...	in '44 there was also a ford.
				16th August.

Hours.				Detentions.—Hours.						Channel.	
From.	To.	Rate per hour.	Distance made.	For Fuel.	Grounding.	Not steering.	Obliged to warp.	Height of Bank.	Cultivation, Jungle, &c.	Depth, feet.	Width, yards.
		M. F.	M. F.								
4.50	7.00	5 4	12 0	...	...	...	...	1 to 5	B	7	900
7.00	8.00	5 4	5 4	...	...	...	...	1 to 5	B	9	700
8.00	9.00	3 0	3 0	...	...	...	...	1 to 6	B	14	250
9.00	10.00	3 0	3 0	...	...	...	...	1 to 4	B	14	250
10.00	11.45	2 0	3 4	...	...	...	...	1 to 3	B	12	300
11.45	1.15	...	...	1½	...	...	...	1 to 4	B	...	...
1.15	3.00	3 2	5 0	...	...	...	...	1 to 5	B	4 to 5	1200
3.00	5.45	4 0	11 0	...	...	...	...	1 to 5	B	5 to 6	1300
5.45	7.00	...	...	...	...	1¼	...	2	B	10	250
5.30	6.00	3 4	1 6	...	...	...	...	2	B	18	250
6.00	7.00	3 0	3 0	...	...	...	...	3	B	12	600
7.00	8.00	4 0	4 0	...	...	...	...	2	B	10	700
8.00	9.00	4 0	4 0	...	...	...	...	2	B	10	600
9.00	10.00	3 0	3 0	...	...	...	...	3	B	12	500
10.00	10.40	4 0	2 6	...	...	...	...	2	B	16	200
10.40	0.50	...	...	...	2.10	...	...	2	B	18	20
0.50	1.10	0 4	0 2	...	...	...	...	2	B	17	300
1.10	4.00	...	...	3.50	...	...	...	2	B	17	300
4.00	5.00	4 0	4 0	...	...	...	...	3	B	16	450
5.00	7.35	3 0	7 5	...	...	...	...	4	B	12	600
5.00	6.00	2 4	2 4	...	...	...	...	3	B	7	1000
6.00	7.00	2 0	2 0	...	...	...	...	2	C	4 to 7	1200
7.00	8.45	2 0	3 4	...	...	...	...	3	B	4 to 6	1200
8.45	9.35	...	...	...	...	...	...	...	...	...	...
9.35	12.00	1 6	4 1	...	...	...	...	2	C	4 to 9	1000
12.00	4.00	2 0	8 0	...	...	...	...	3	B	6 to 12	650
		800 2	133 10	40.40	101.45	86.10					

The number of hours under steam this voyage was 489½; the distance from

(True Copy.) (Signed) E. J. Browne,

Secretary Scinde Government.

(True Copies.) (Signed) P. M. Melvill, *Lieut. Col.*,

Secretary to Government.

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
2 to 4	Jangra L.	Ferry.	...	Channel intricate, and narrow.
2 to 4	....	...	...	
3 to 6	Tajoke R.	Ferry.	...	
3 to 6	Bodala L.	...	...	
4 to 6	Goarka L.	Ferry.	...	
...	....	...	...	
3 to 5	....	...	...	
2 to 7	Todb R.	Ferry.	...	In a contracted part of the river, vessels
5	....	...	...	would not steer, and the paddle was seriously strained, and nearly all the floats broken by striking the bank.
3 to 6	Boogiah L.	Ferry.	...	17th August.
3 to 7	Madher L.	...	...	
3 to 5	Kameka L.	...	...	
3 to 5	Sabhan L.	...	...	
4 to 6	Pany Girab R.....	Ferry.	...	
2 to 4	Mohunker L.	...	...	Channel divided: went up the wrong
3	....	...	...	one and warped over the bar, having
3	....	...	...	two feet on one side, and not breadth
3	....	...	...	enough of deeper water to admit of
2 to 5	Mehter R.	Ferry.	...	passing.
3 to 5	Matanno R.	...	...	Four miles below Nimrod fort. 18th August.
4 to 6	Buttee L.	Ferry.	...	Lost half an hour by wrong channel:
4 to 6	Nimrod L.	Ferry.	...	current strong, channel bad.
4 to 6	....	...	...	
...	....	...	...	Stopt 0.50 to repair paddle-wheel.
5 to 7	Kinadaka L.	...	...	
4 to 6	Ferozepore L.....	...	...	Secured at Ferozepoor Ghat.

"Sukkur" to Ferozepore by water being just 800 miles.

(Signed) W. Christopher, *Senior Lieutenant, I. N.*

(True Copy.) (Signed) F. T. Powell, *Commander, I. N.,*

Commanding Indus Flotilla.

ART. VII.—*Report on the practicability of Navigating the River Nerbudda between Hindia and the Falls of Dharee.* By Lieutenant R. H. KEATINGE, Assistant to the Superintendent at Nimar.

[Presented by Government.]

No. 310 OF 1848.

From R. N. C. HAMILTON, *Esquire, Resident at Indore,*

To A. MALET, *Esquire, Chief Secretary to the Government of Bombay.*

DATED INDORE RESIDENCY, 28*th February,* 1848.

SIR,—With reference to my letter, No. 1266, dated 24th August last, forwarding Lieutenant Evans' report on the Navigation of the Nerbudda, I have now the honor to forward, for the information of the Hon'ble the Governor-in-Council, a report from Lieutenant Keatinge on the practicability of Navigating the River between Hindia and the Falls at Dharee.

2. The report is unfavorable, and from my own personal examination at Dharee, I am satisfied that, for the purposes of Commerce, the Nerbudda is not available.

I have the honor to be, &c.,

(Signed) R. N. C. HAMILTON,

INDORE RESIDENCY, 28*th February,* 1848. *Resident.*

(Copy)

From Lieut. KEATINGE, *Assistant to the Supt. at Nimar,*

To R. N. C. HAMILTON, *Esquire, Resident at Indore.*

DATED HINDIA, 9*th February,* 1848.

SIR,—On receiving your instructions at Timbornee to examine the Nerbudda from Hindia to the Falls of Dharee, I proceeded to the former place, where I arrived on the 29th of January, and have now the honor to lay before you the result of my expedition.

2. About Hindia the river does not appear to be applied to any

useful purpose, and the only available boats, or boatmen, are those employed at the different ferries or ghauts.

3. The boats are consequently unfitted for ascending and descending the more difficult parts of the river, being too broad and low-sided, and the boatmen are unskilful in their use.

4. With some difficulty I succeeded in procuring, from a village a few miles above Hindia, a boat that, from its shape, was more suited to my purpose, and having fitted it with mast and sail, and engaged boatmen, I started on the afternoon of the 30th of January. The boat was flat-bottomed, 19ft. 9in. long, and 4ft. 9in. broad.

5. I was accompanied from Hindia to Mundhar by two canoes lashed together and manned by fishermen; these I found most useful, as they enabled me to precede the larger boat in places where, from the shallowness of the water, its progress was necessarily slow. From Mundhar I permitted them to return, as I found I could dispense with their assistance for the remaining part of the journey. For any purpose of traffic, these canoes would be perfectly useless, as the waves in the rapid parts of the river completely fill them, and if laden they would sink.

6. From Hindia to the junction of the Ajnal River, the Nerbudda is unusually favorable for navigation. Near the foot of Joga we were delayed by some rapids, but to boatmen well acquainted with the River they would be impediments of no moment.

7. Commencing at the Ajnal River the bed of the Nerbudda extends to nearly double its usual width, and is divided into many small shallow streams, running between rocks and jungle, the inclination being so great as to give this part of the river more the appearance of a collection of mountain streamlets than the course of an important river. At the junction of the Machuch River, these rapids cease, and the stream is concentrated into one large deep pool to the head of the Mundhar falls, a distance of two miles.

8. The Mundhar falls are almost as high, and the descent of water more perpendicular, than the falls of Dharee, which in general character they closely resemble. Towards the southern bank a smaller stream makes the same descent in a number of short drops, down which my boat was dragged by thirty men, but in places it was almost carried.

9. From Mundhar to Basnia, opposite Chandghur, the river resumes its usual character of pools and shallows.

10. From Basnia to within a few miles of Dharee, high abrupt rocks rise on each bank of the river, which flows between them, hemmed in to about a quarter its usual width, with rapids almost every mile: at one place it narrows to 34 feet.

11. I reached Dharee at noon on the 7th of February, having thus been nine days on my way.

12. From my personal observations, and the enquiries I was enabled to make, I am of opinion that, from the junction of the Ajnal river to the bottom of the Mundhar falls, the Nerbudda is useless for navigation.

13. From Basnia to near Dharee the river is only just passable, and I fear that the number of men who would be requisite to take a laden boat down it would make the cost of carriage equal to, if not greater than, what it would be on land.

14. It is impossible to conjecture how the rise of the river during the rains may affect this last portion of the stream. It appears to me that it would probably cover the difficulties, but the boatmen hold a contrary opinion, and, until a trial has been made in that season, the question must, I fear, remain undecided.

I have the honor to be, &c.,

(Signed) R. H. KEATINGE, *Assistant to the Supt. of Nimar.*

(True Copy.) (Signed) W. F. EDEN, *1st Assistant to Resident.*

(True Copies.) (Signed) J. G. LUMSDEN, *Secretary to Government.*

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on 30 January, 2020